FIG. 1

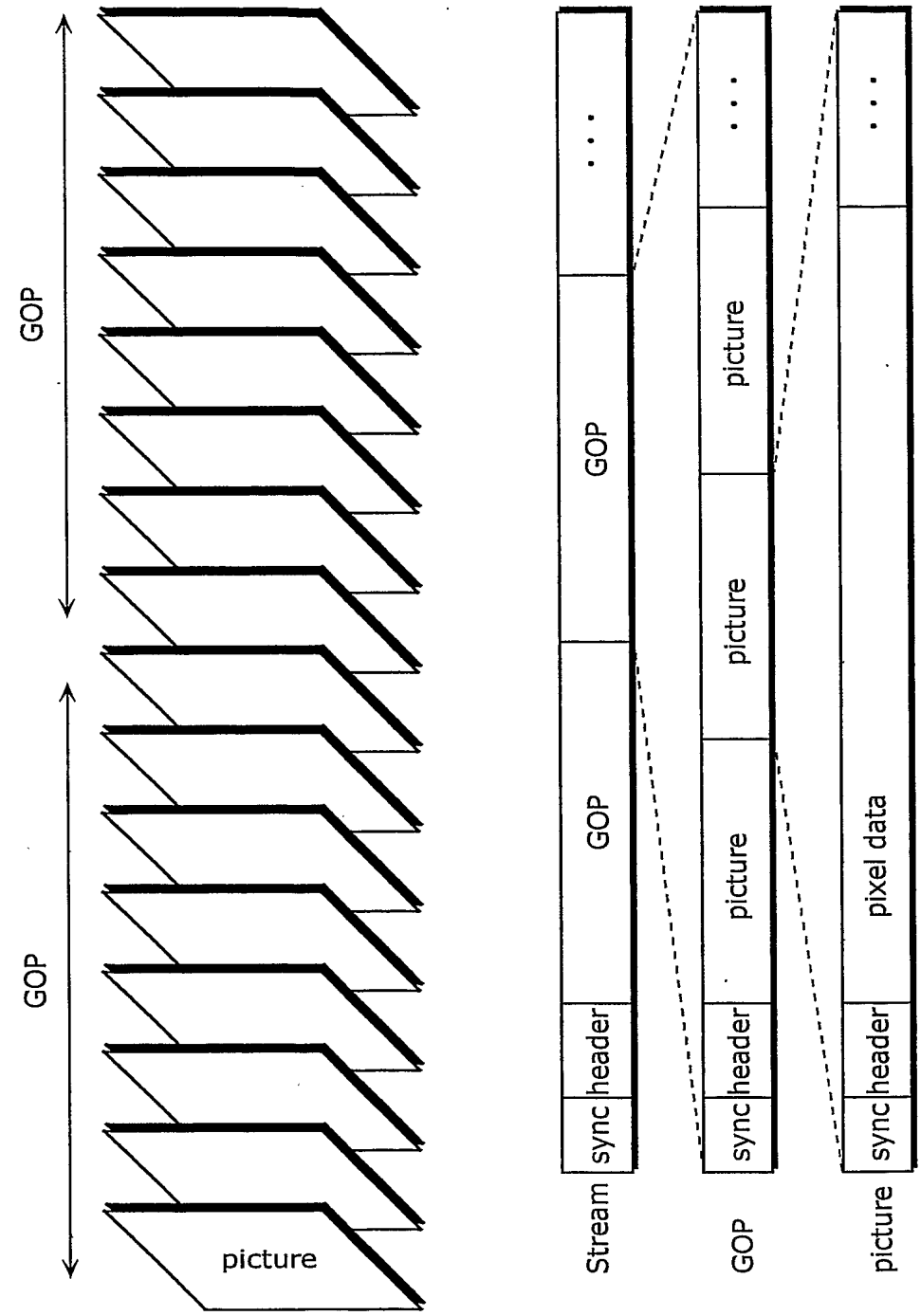

GOP
GOP
picture
Stream
sync
header
GOP
GOP
. . .
GOP
sync
header
picture
picture
picture
. . .
picture
sync
header
pixel data
. . .

FIG. 2A

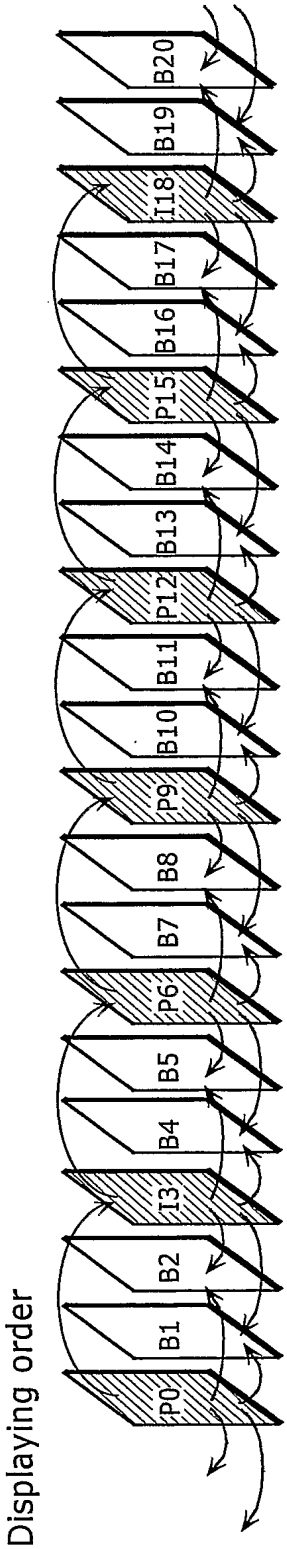

Displaying order
P0
B1
B2
I3
B4
B5
P6
B7
B8
P9
B10
B11
P12
B13
B14
P15
B16
B17
I18
B19
B20

FIG. 2B

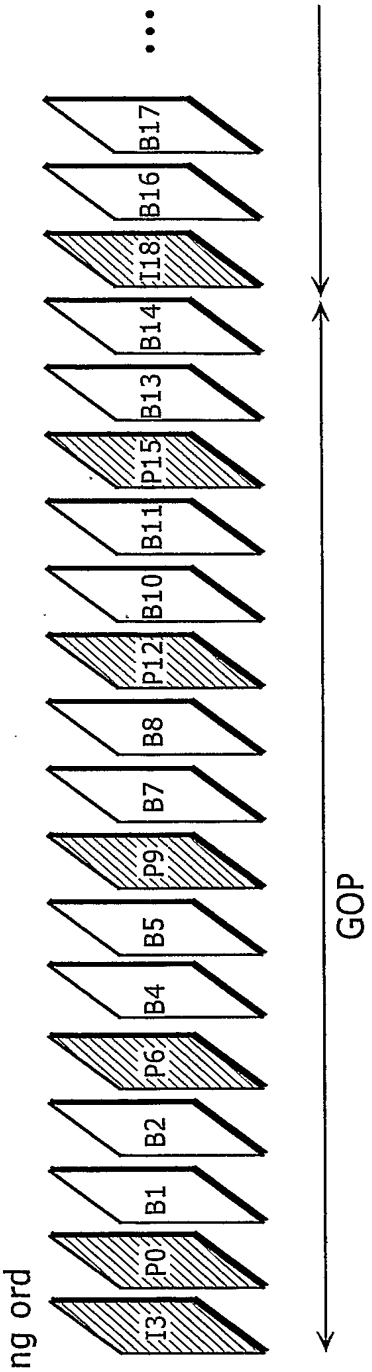

Decoding ord
I3
P0
B1
B2
P6
B4
B5
P9
B7
B8
P12
B10
B11
P15
B13
B14
I18
B16
B17
...
GOP

FIG. 3

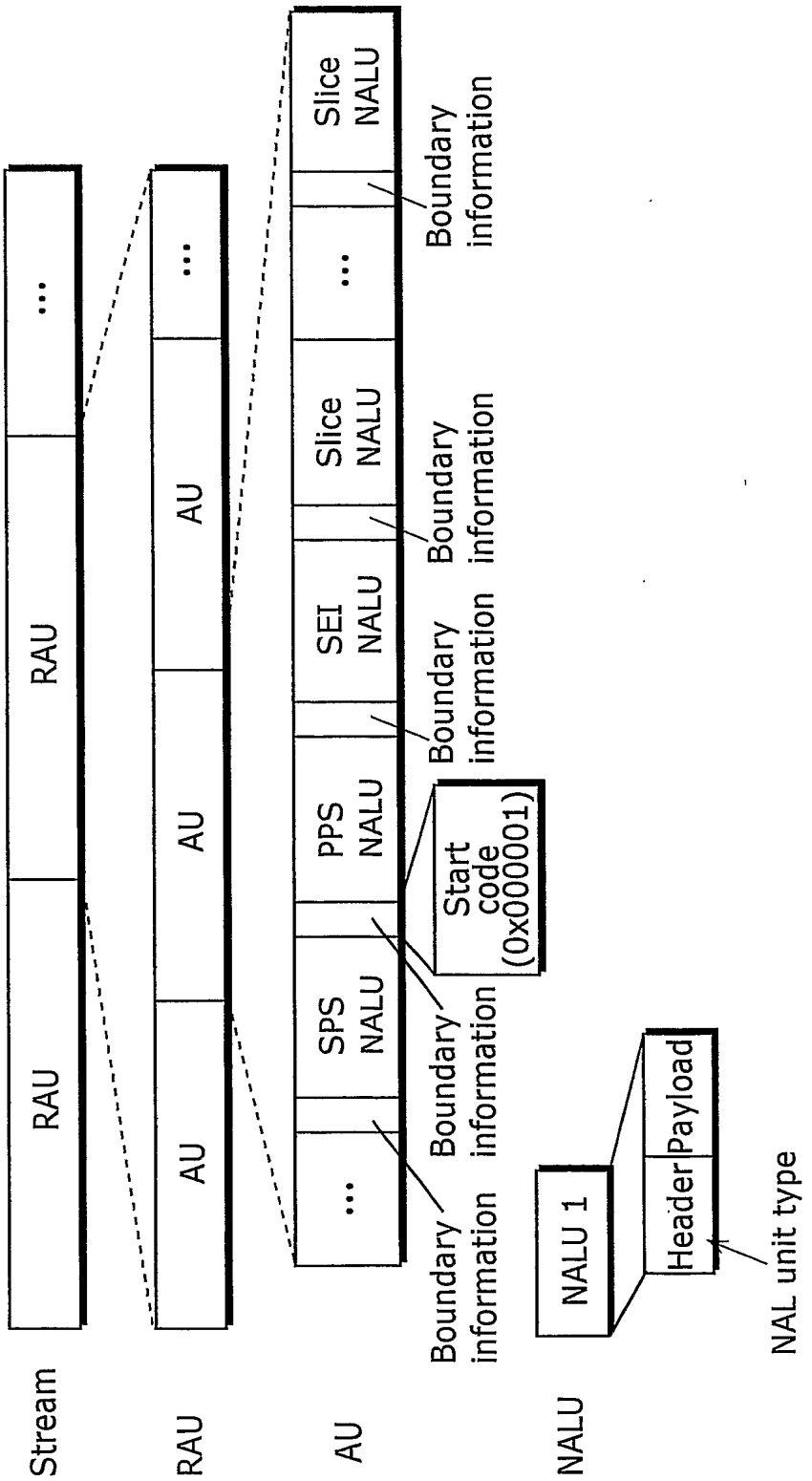

Stream
RAU
RAU
...
RAU
AU
AU
...
AU
...
SPS NALU
PPS NALU
SEI NALU
Slice NALU
...
Slice NALU
Boundary information
Boundary information
Boundary information
Boundary information
Boundary information
Start code (0x000001)
NALU
NALU 1
Header
Payload
NAL unit type

FIG. 4

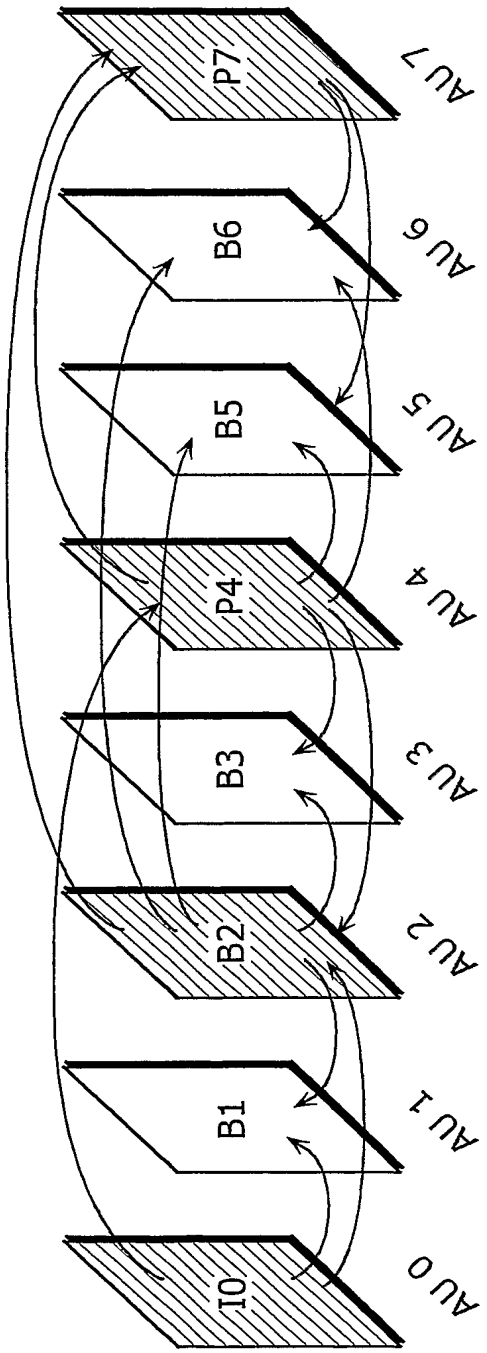


FIG. 5

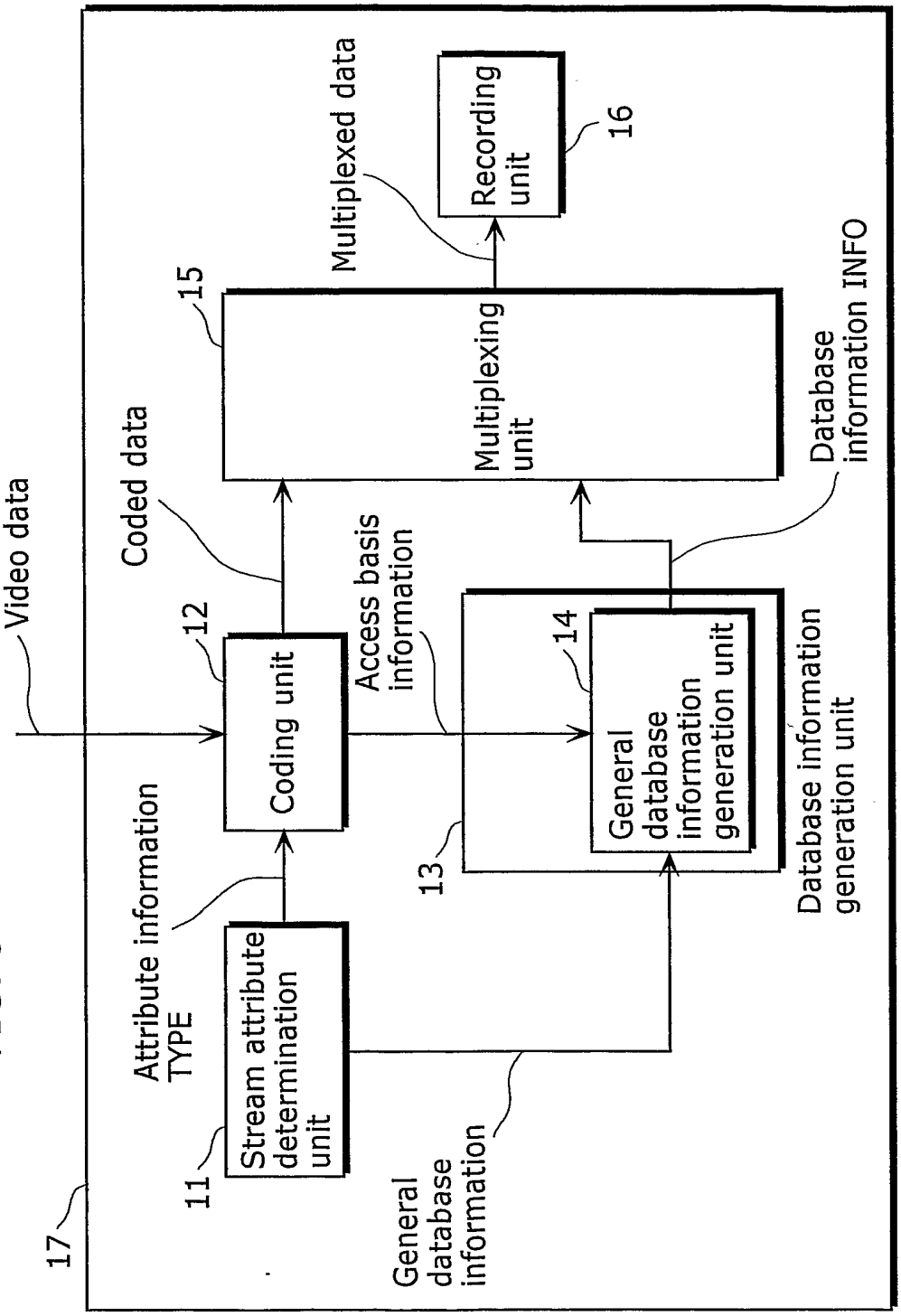

Video data
Coded data
Access basis information
Database information INFO
Multiplexed data
Attribute information TYPE
General database information
Database information generation unit
Coding unit
Multiplexing unit
Recording unit
Stream attribute determination unit
General database information generation unit
12
15
16
11
14
13
17

FIG. 6

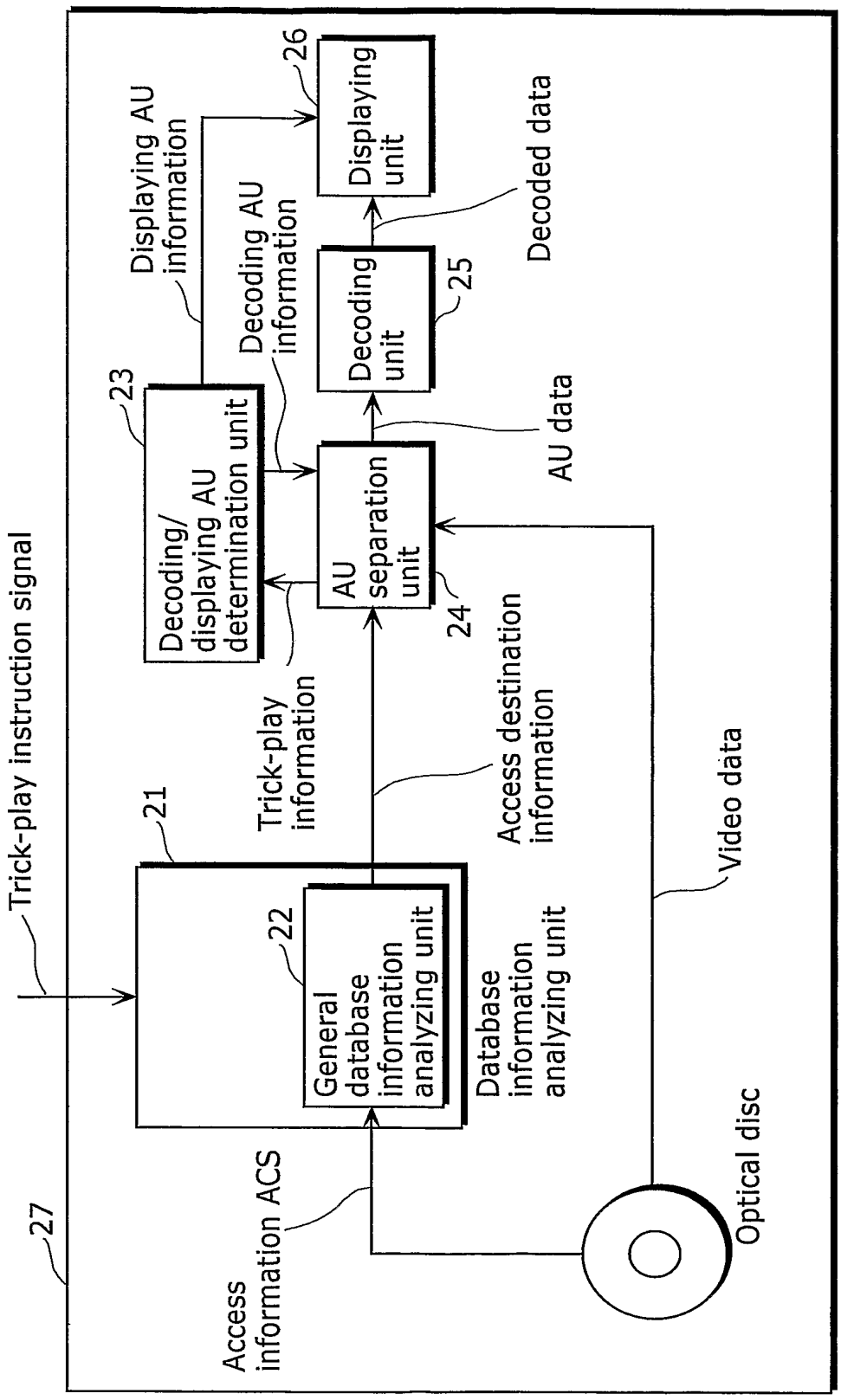

Trick-play instruction signal
21
22
General database information analyzing unit
Database information analyzing unit
Access information ACS
27
Optical disc
Video data
Trick-play information
Access destination information
23
Decoding/ displaying AU determination unit
24
AU separation unit
AU data
Decoding unit
25
Decoded data
Displaying unit
26
Displaying AU information
Decoding AU information

FIG. 7A

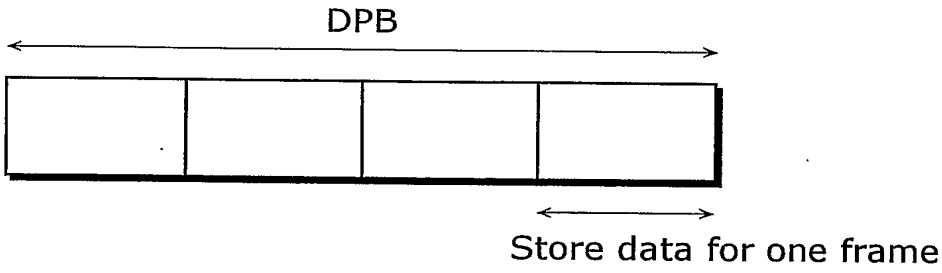

DPB
Store data for one frame

FIG. 7B

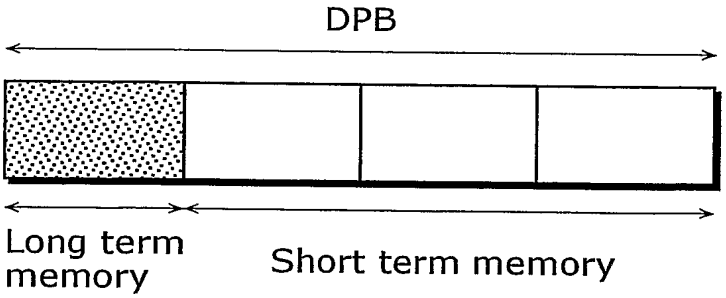

DPB
Long term memory
Short term memory

FIG. 8

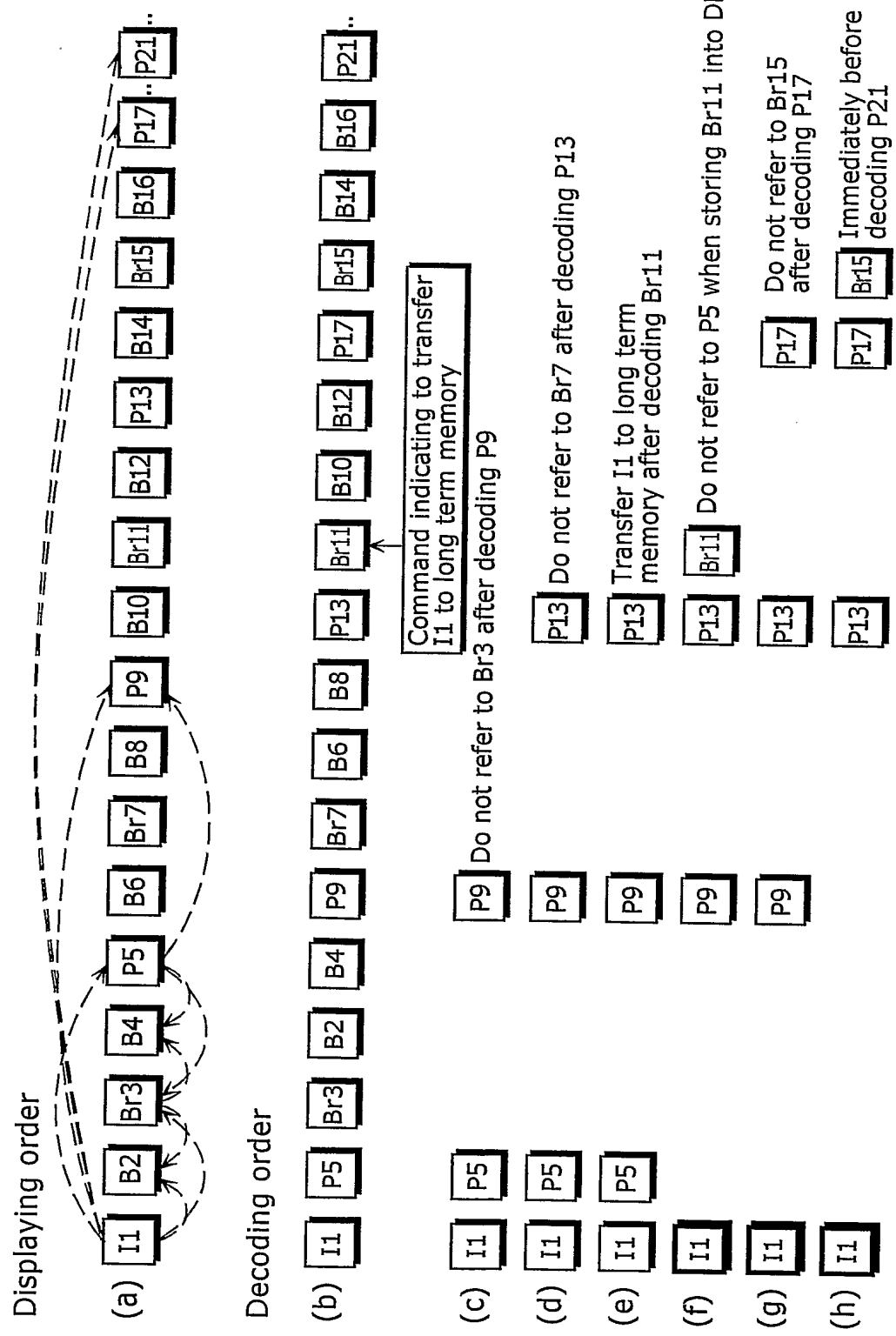

Displaying order
(a)
I1 B2 Br3 B4 P5 B6 Br7 B8 P9 B10 Br11 B12 P13 B14 Br15 B16 P17 P21
Decoding order
(b)
I1 P5 Br3 B2 B4 P9 Br7 B6 B8 P13 Br11 B10 B12 P17 Br15 B14 B16 P21
Command indicating to transfer I1 to long term memory
(c)
I1 P5 P9
Do not refer to Br3 after decoding P9
(d)
I1 P5 P9 P13
Do not refer to Br7 after decoding P13
(e)
I1 P5 P9 P13
Transfer I1 to long term memory after decoding Br11
(f)
I1 P9 P13 Br11
Do not refer to P5 when storing Br11 into DPB
(g)
I1 P9 P13 P17
Do not refer to Br15 after decoding P17
(h)
I1 P13 P17 Br15
Immediately before decoding P21

FIG. 9

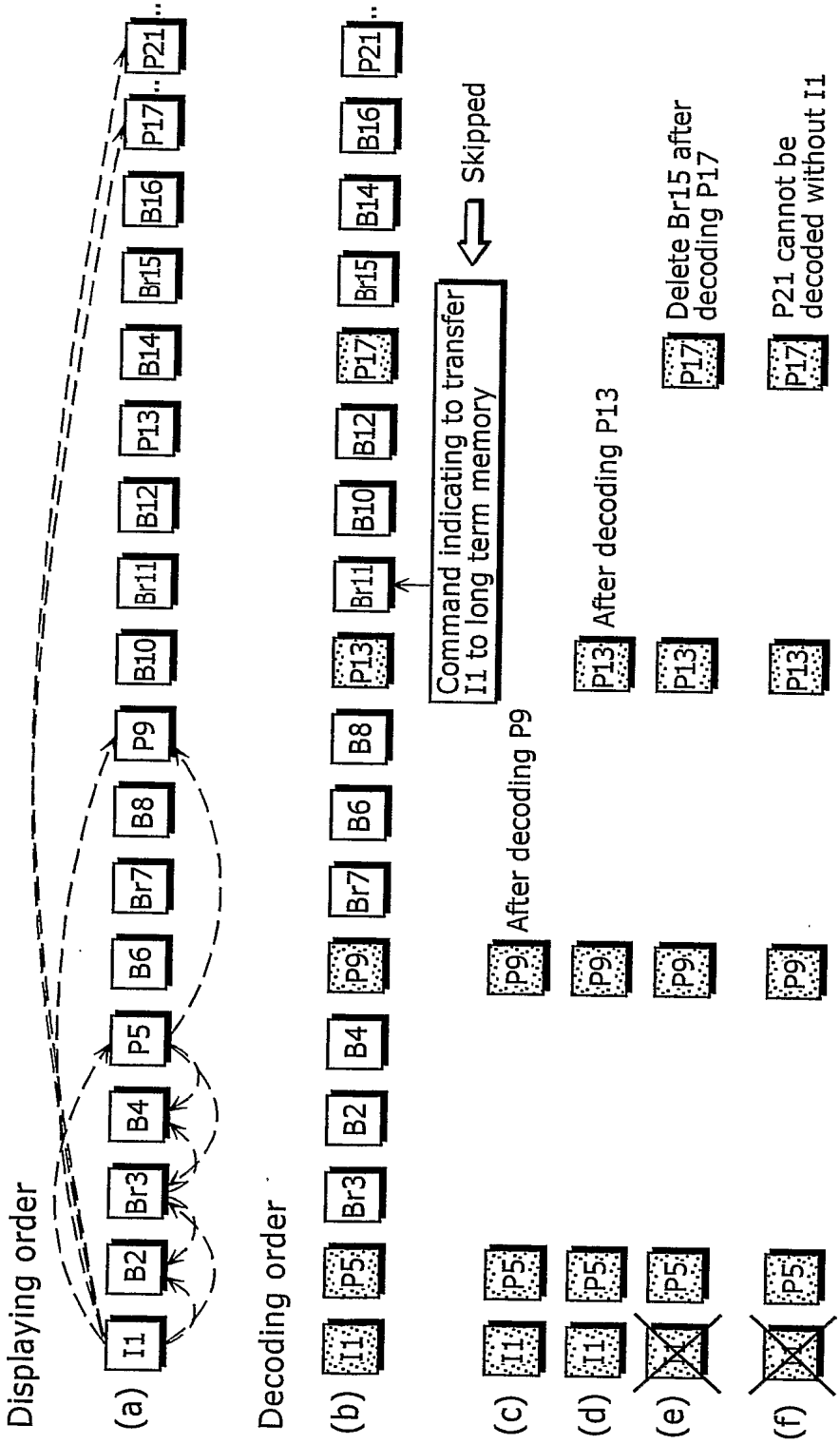

Displaying order
(a)
I1
B2
Br3
B4
P5
B6
Br7
B8
P9
B10
Br11
B12
P13
B14
Br15
B16
P17
P21
Decoding order
(b)
I1
P5
Br3
B2
B4
P9
Br7
B6
B8
P13
Br11
B10
B12
P17
Br15
B14
B16
P21
Command indicating to transfer I1 to long term memory
Skipped
(c)
I1
P5
P9
After decoding P9
(d)
I1
P5
P9
P13
After decoding P13
(e)
P5
P9
P13
P17
Delete Br15 after decoding P17
(f)
P5
P9
P13
P17
P21 cannot be decoded without I1

FIG. 10

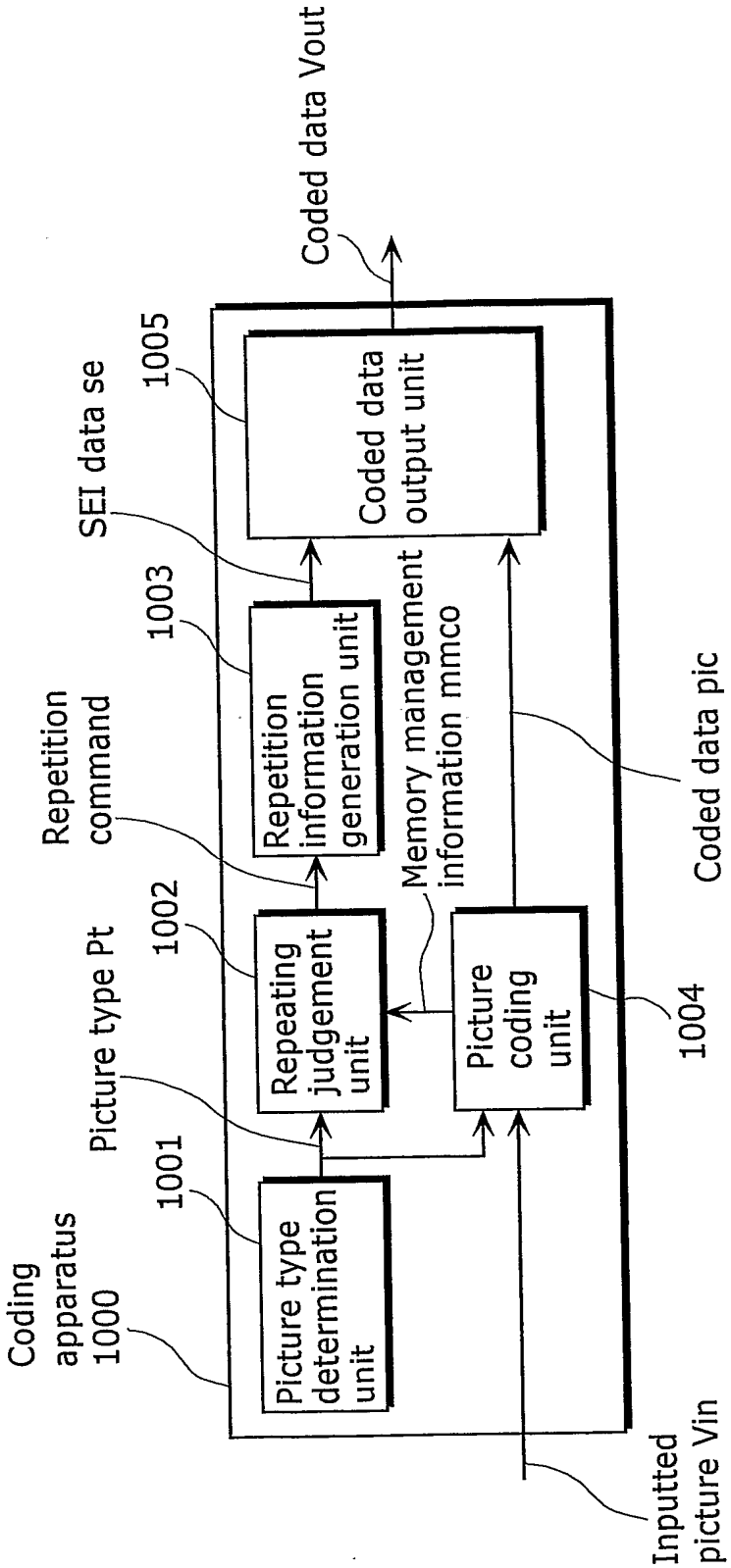

Coding apparatus 1000
Picture type determination unit
1001
Picture type Pt
Repeating judgement unit
1002
Repetition command
Repetition information generation unit
1003
SEI data se
Coded data output unit
1005
Coded data Vout
Memory management information mmco
Picture coding unit
1004
Coded data pic
Inputted picture Vin

FIG. 11

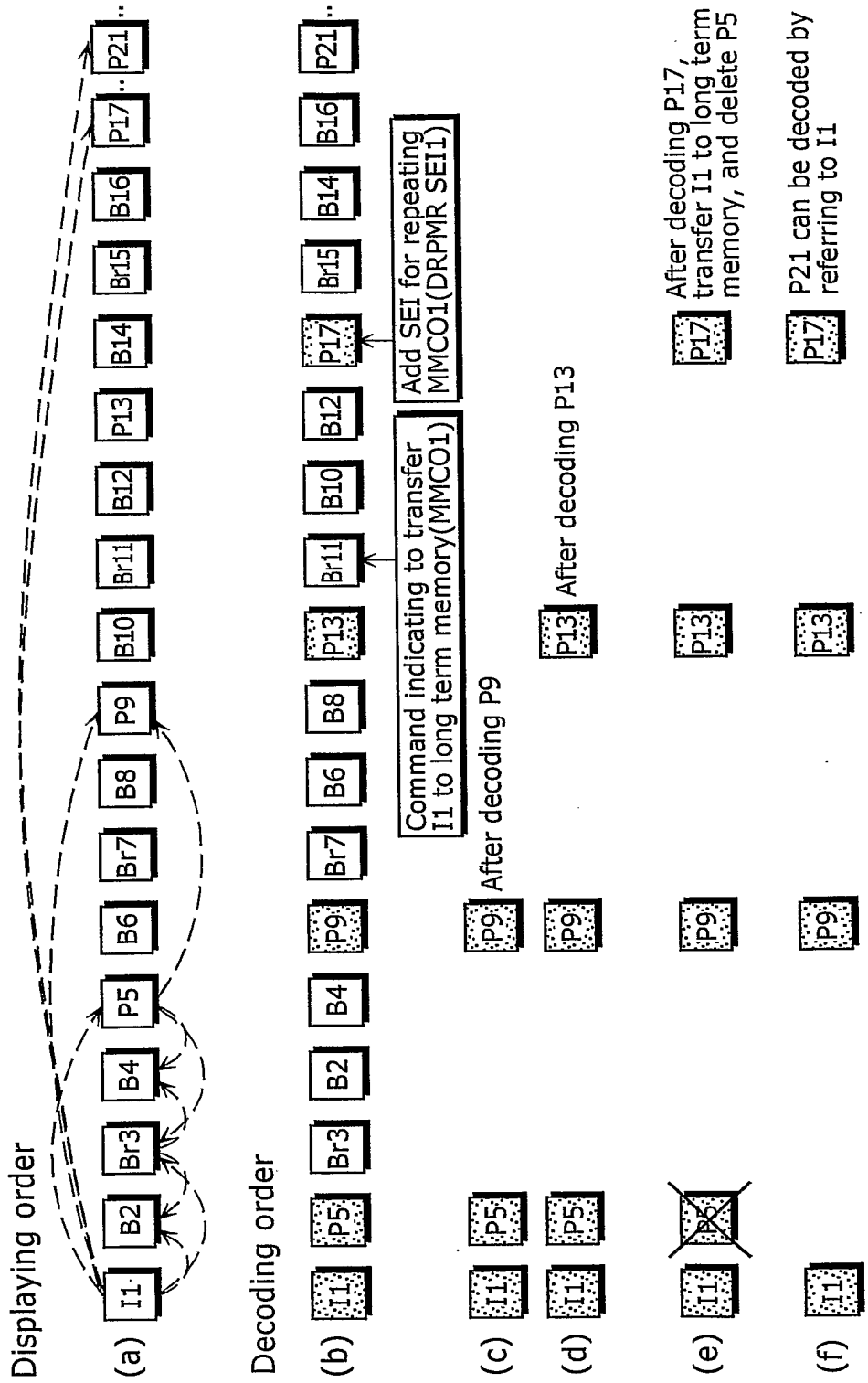

Displaying order
(a)
I1 B2 Br3 B4 P5 B6 Br7 B8 P9 B10 Br11 B12 P13 B14 Br15 B16 P17 P21
Decoding order
(b)
I1 P5 Br3 B2 B4 P9 Br7 B6 B8 P13 Br11 B10 B12 P17 Br15 B14 B16 P21
Command indicating to transfer I1 to long term memory(MMCO1)
Add SEI for repeating MMCO1(DRPMR SEI1)
(c)
I1 P5 P9
After decoding P9
(d)
I1 P5 P9 P13
After decoding P13
(e)
I1 P5 P9 P13 P17
After decoding P17, transfer I1 to long term memory, and delete P5
(f)
I1 P9 P13 P17
P21 can be decoded by referring to I1

FIG. 12A

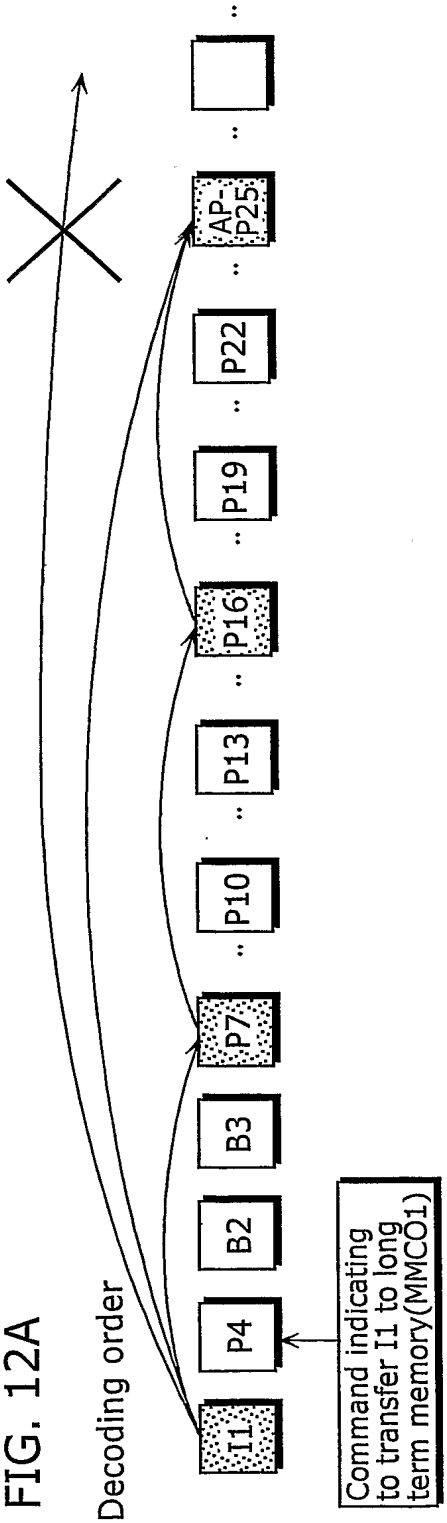


FIG. 12B

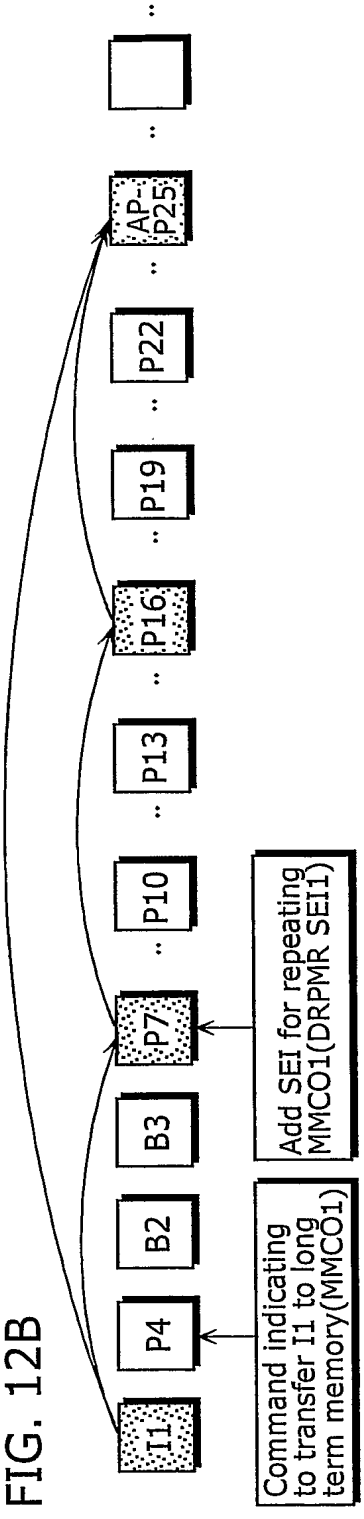


FIG. 13

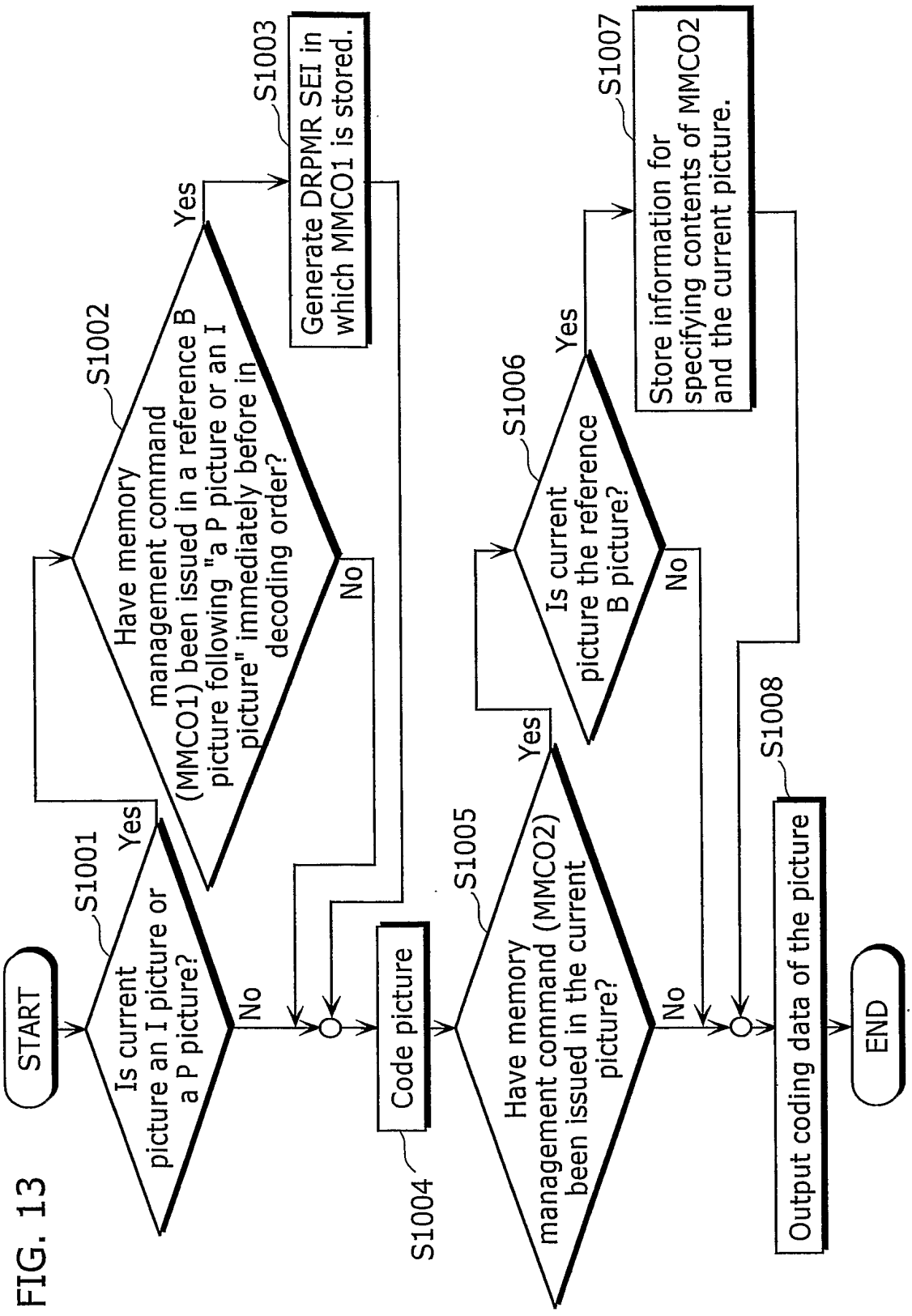

START
S1001
Is current picture an I picture or a P picture?
Yes
No
S1002
Have memory management command (MMCO1) been issued in a reference B picture following "a P picture or an I picture" immediately before in decoding order?
Yes
No
S1003
Generate DRPMR SEI in which MMCO1 is stored.
S1004
Code picture
S1005
Have memory management command (MMCO2) been issued in the current picture?
Yes
No
S1006
Is current picture the reference B picture?
Yes
No
S1007
Store information for specifying contents of MMCO2 and the current picture.
S1008
Output coding data of the picture
END

FIG. 14

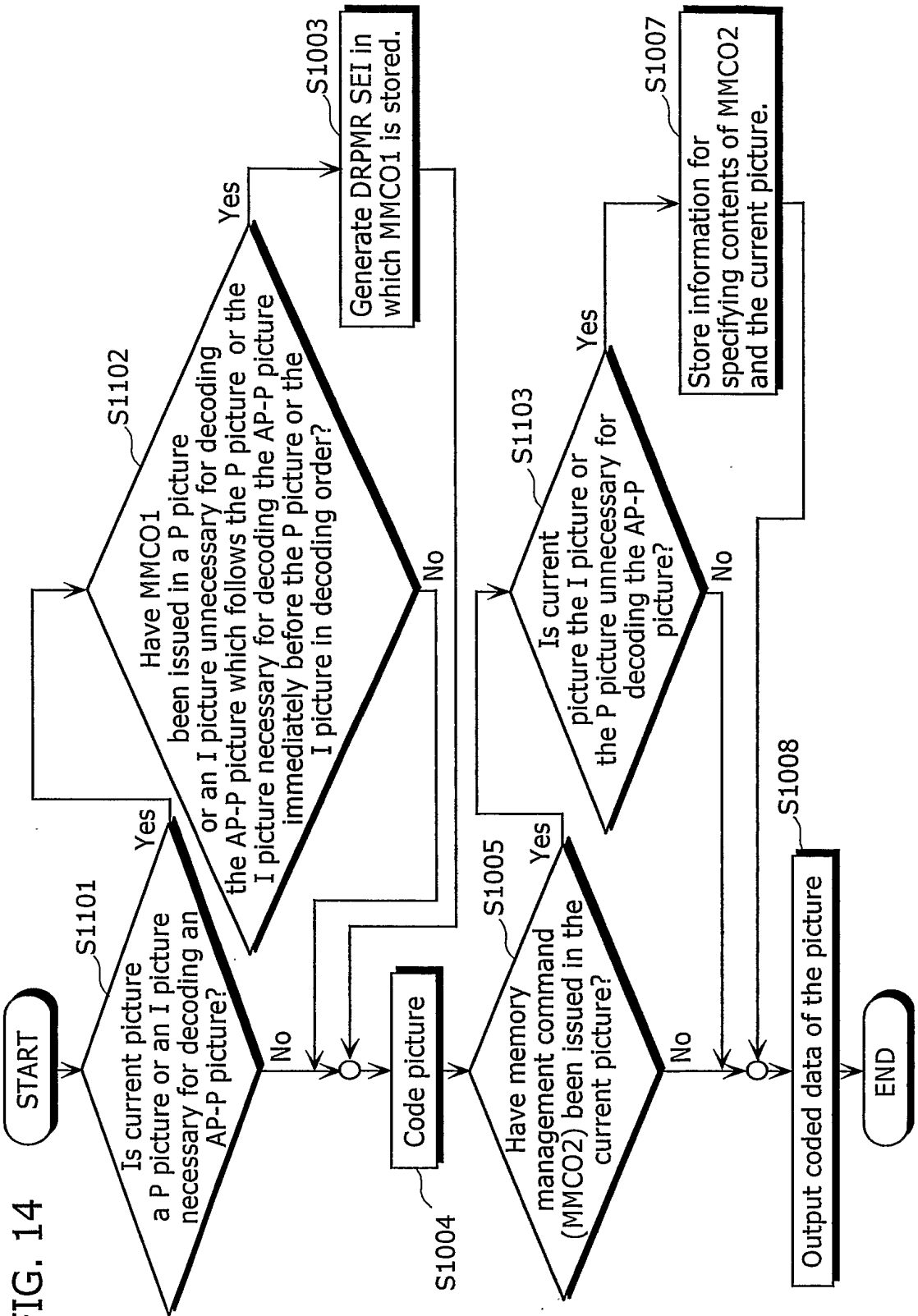

START
S1101
Is current picture a P picture or an I picture necessary for decoding an AP-P picture?
Yes
No
S1102
Have MMCO1 been issued in a P picture or an I picture unnecessary for decoding the AP-P picture which follows the P picture or the I picture necessary for decoding the AP-P picture or the immediately before the P picture or the I picture in decoding order?
Yes
No
S1003
Generate DRPMR SEI in which MMCO1 is stored.
S1004
Code picture
S1005
Have memory management command (MMCO2) been issued in the current picture?
Yes
No
S1103
Is current picture the I picture or the P picture unnecessary for decoding the AP-P picture?
Yes
No
S1007
Store information for specifying contents of MMCO2 and the current picture.
S1008
Output coded data of the picture
END

FIG. 15

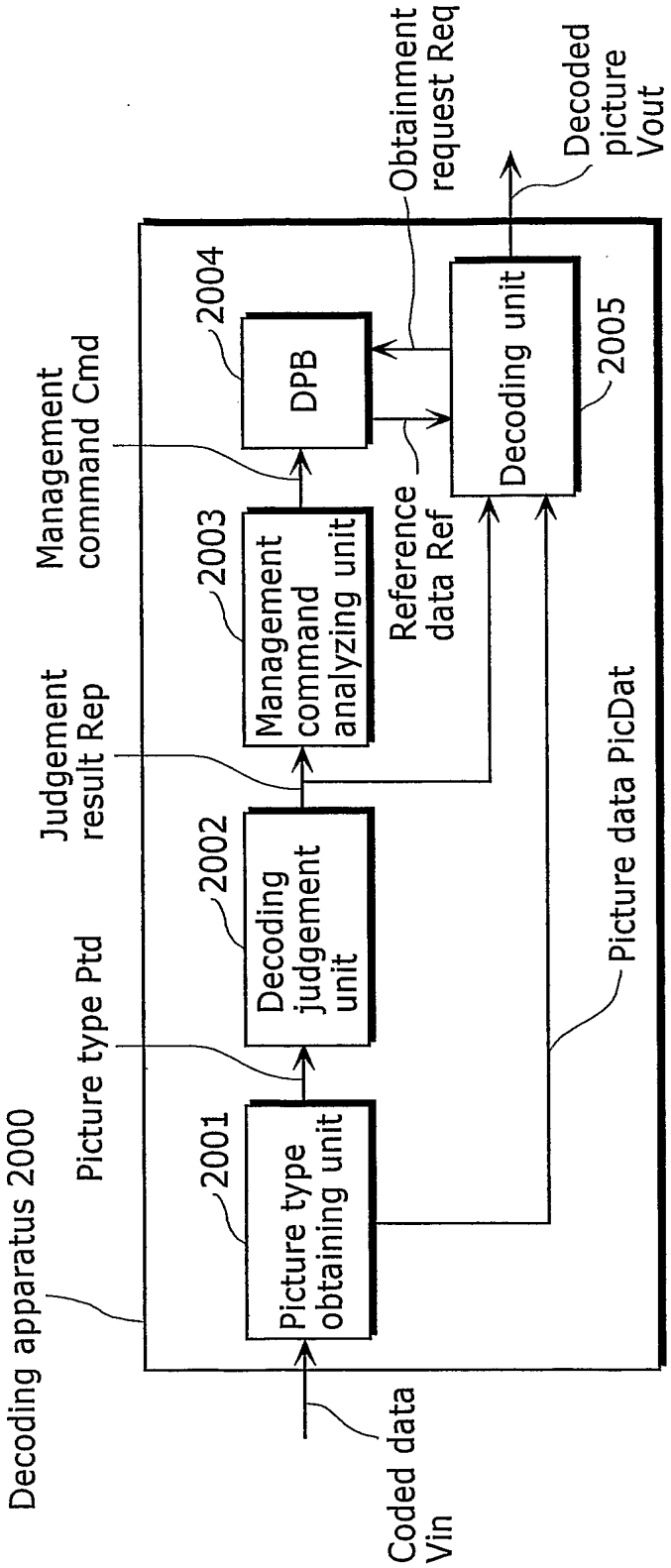

Decoding apparatus 2000
Coded data Vin
2001
Picture type obtaining unit
Picture type Ptd
2002
Decoding judgement unit
Judgement result Rep
2003
Management command analyzing unit
Management command Cmd
2004
DPB
Obtainment request Req
Reference data Ref
Decoding unit
2005
Decoded picture Vout
Picture data PicDat

FIG. 16

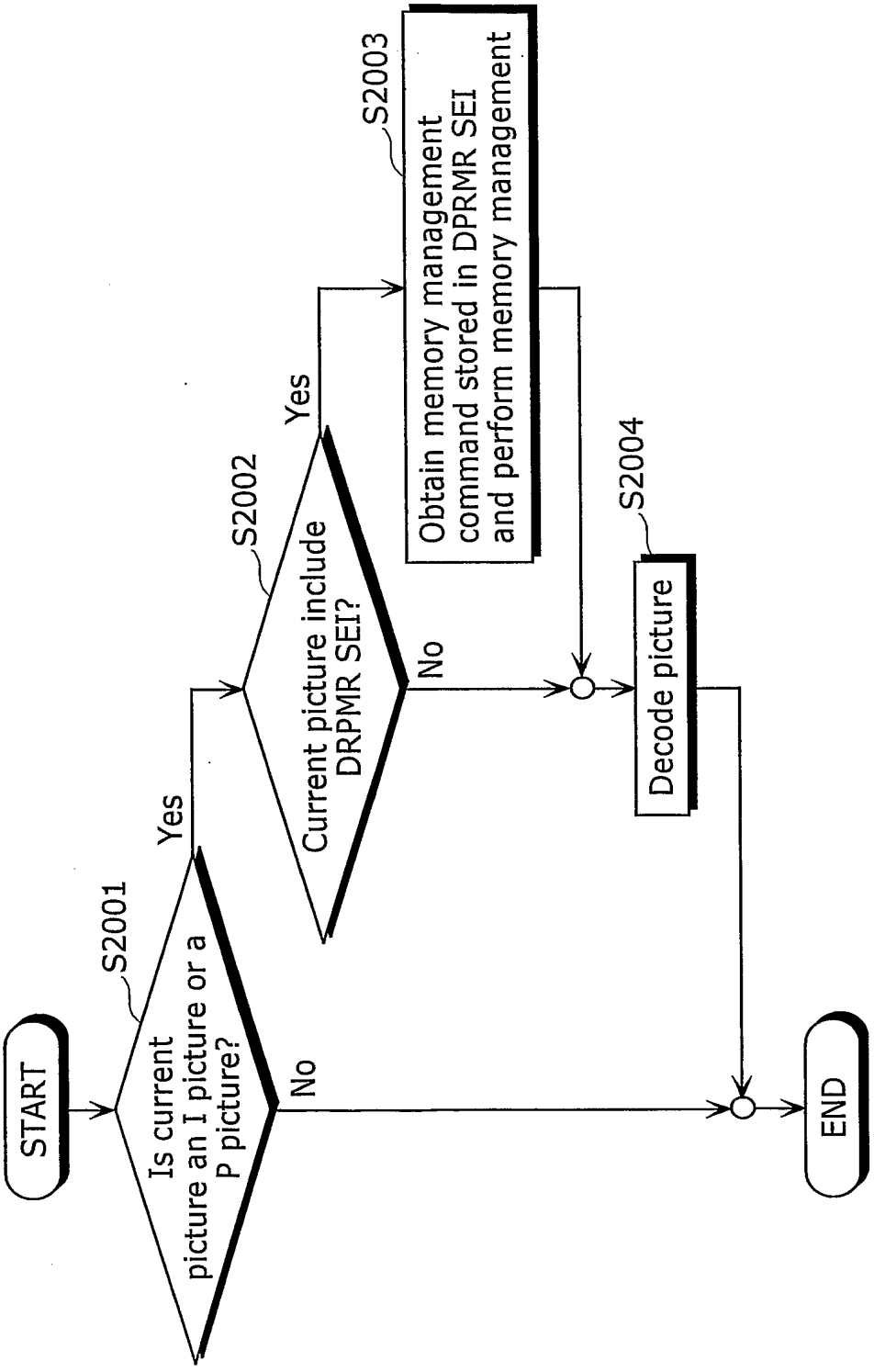

START
S2001
Is current picture an I picture or a P picture?
Yes
No
S2002
Current picture include DRPMR SEI?
Yes
No
S2003
Obtain memory management command stored in DPRMR SEI and perform memory management
S2004
Decode picture
END

FIG. 17

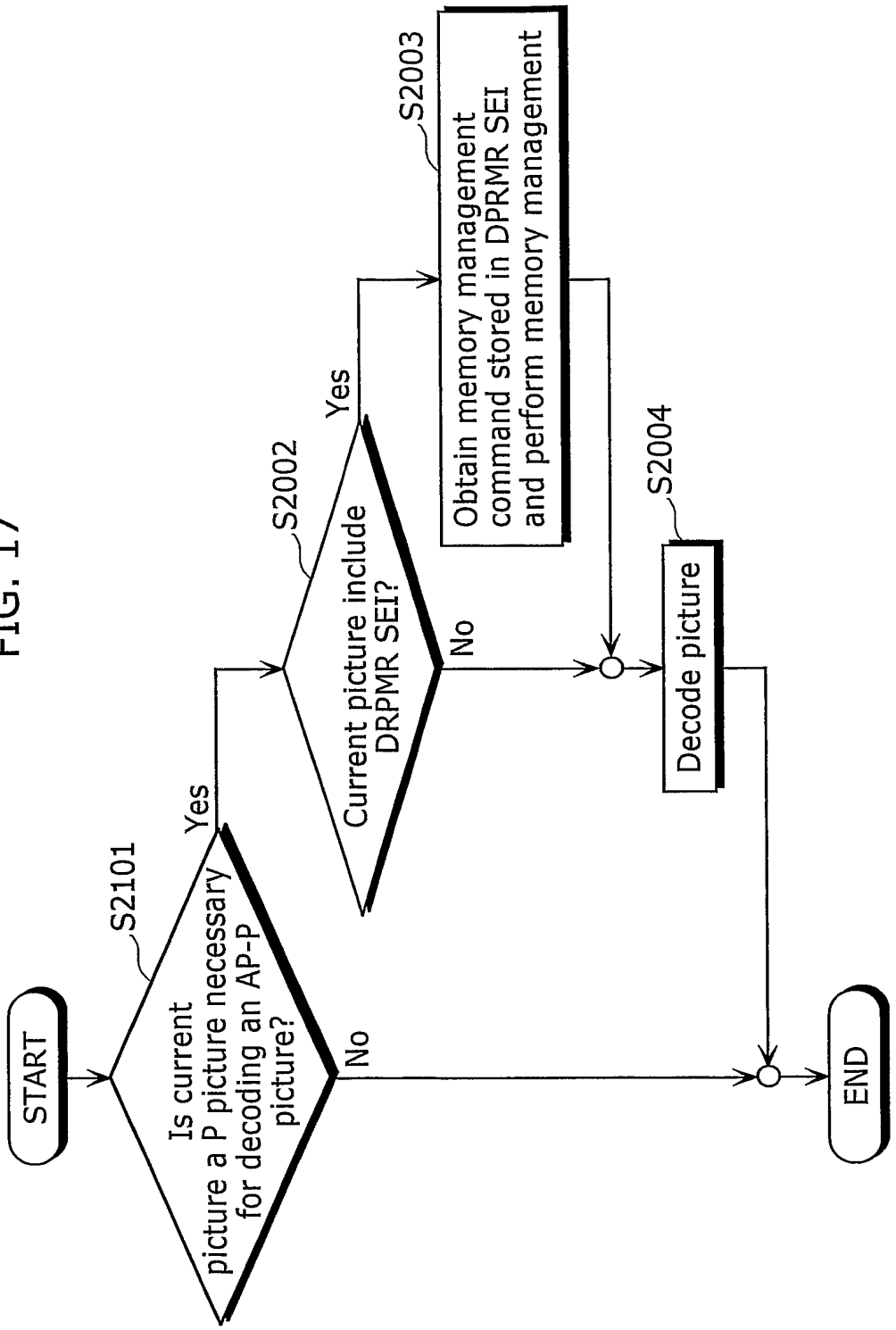

START
S2101
Is current picture a P picture necessary for decoding an AP-P picture?
Yes
No
S2002
Current picture include DRPMR SEI?
Yes
No
S2003
Obtain memory management command stored in DPRMR SEI and perform memory management
S2004
Decode picture
END

FIG. 18

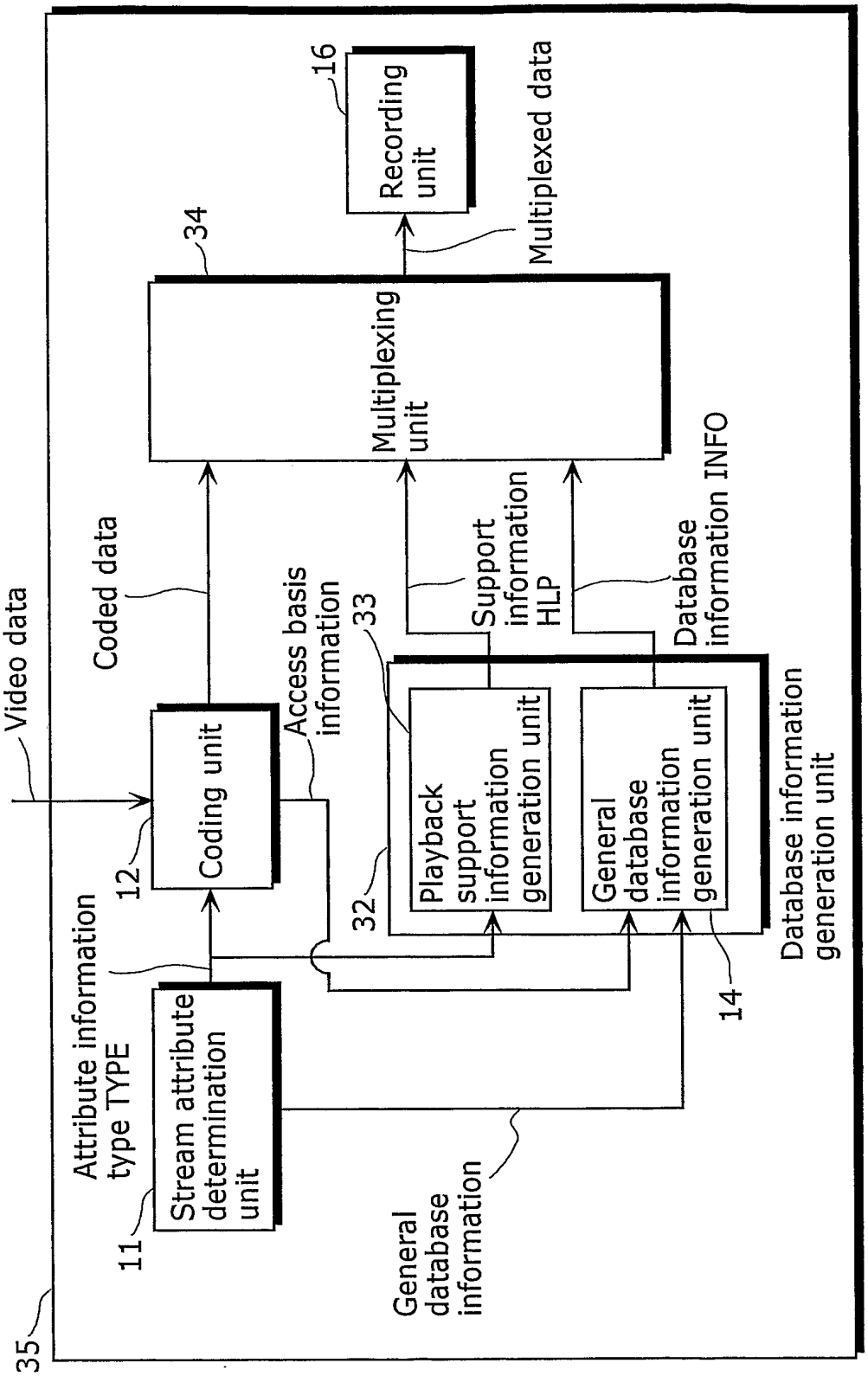

Video data
Coded data
Access basis information
Support information HLP
Database information INFO
Attribute information type TYPE
General database information
Coding unit
Multiplexing unit
Recording unit
Multiplexed data
Playback support information generation unit
General database information generation unit
Database information generation unit
Stream attribute determination unit
12
16
34
33
32
14
11
35

FIG. 19A

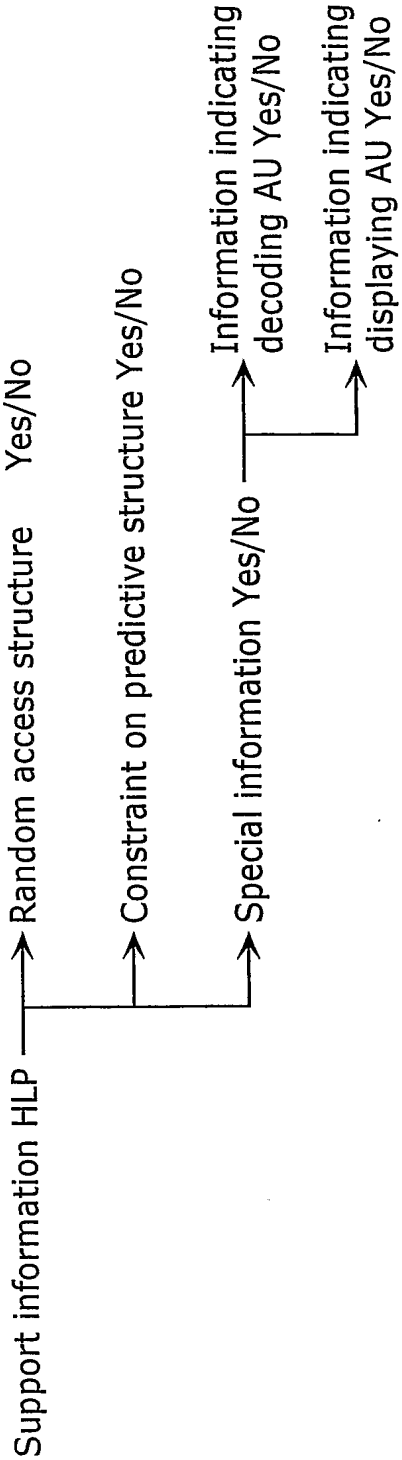


FIG. 19B

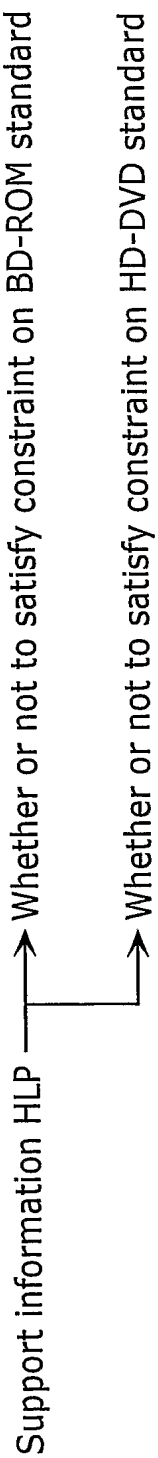


FIG. 20

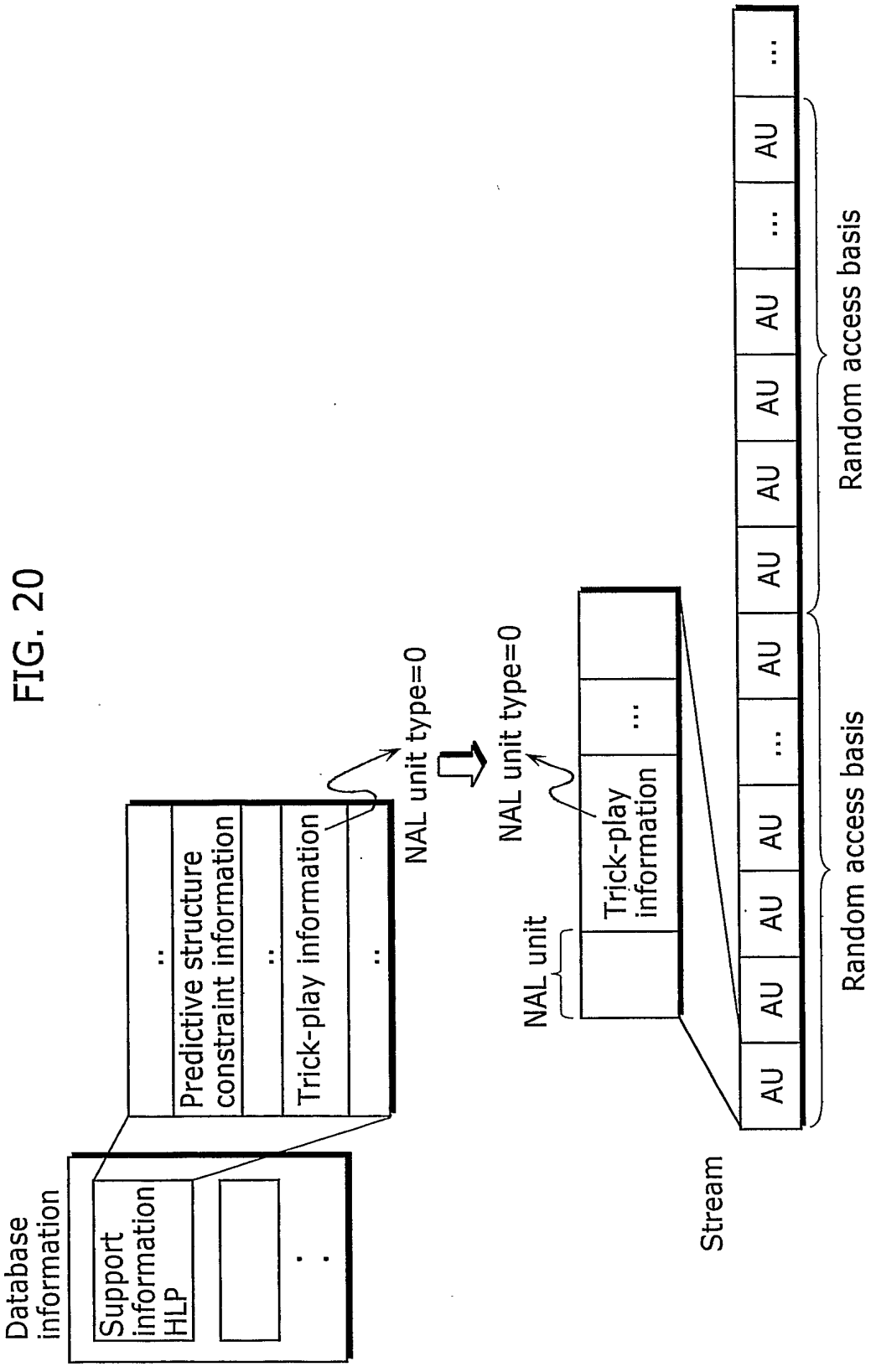

Database information
Support information HLP
Predictive structure constraint information
Trick-play information
NAL unit type=0
NAL unit type=0
NAL unit
Trick-play information
Stream
AU
Random access basis
Random access basis

FIG. 21

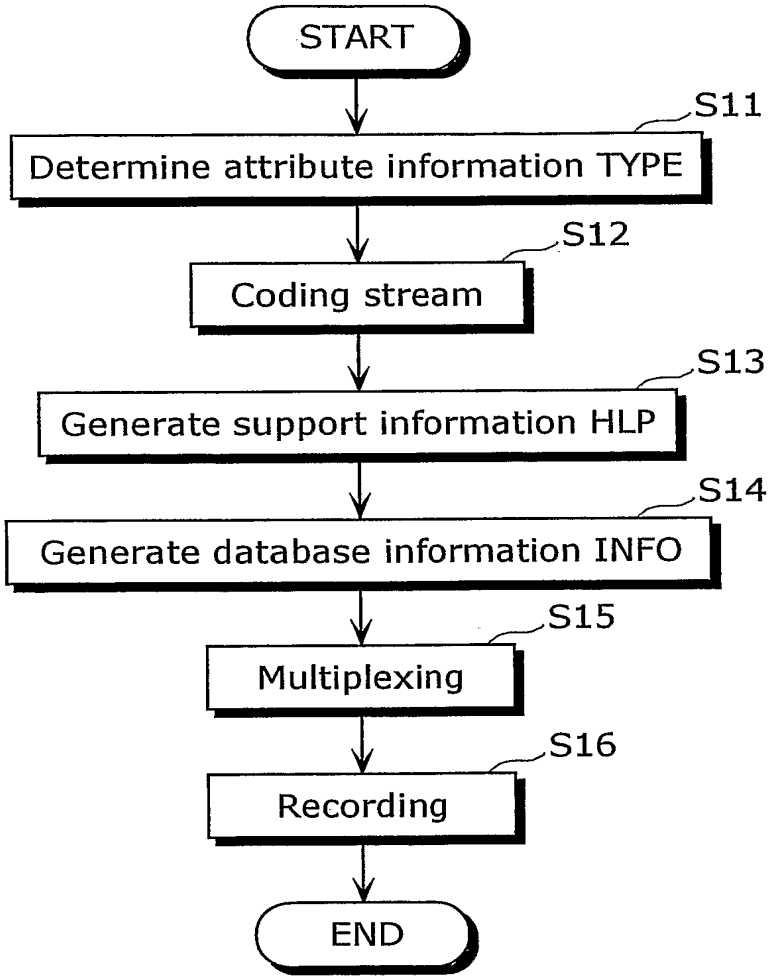

START
S11
Determine attribute information TYPE
S12
Coding stream
S13
Generate support information HLP
S14
Generate database information INFO
S15
Multiplexing
S16
Recording
END

FIG. 22

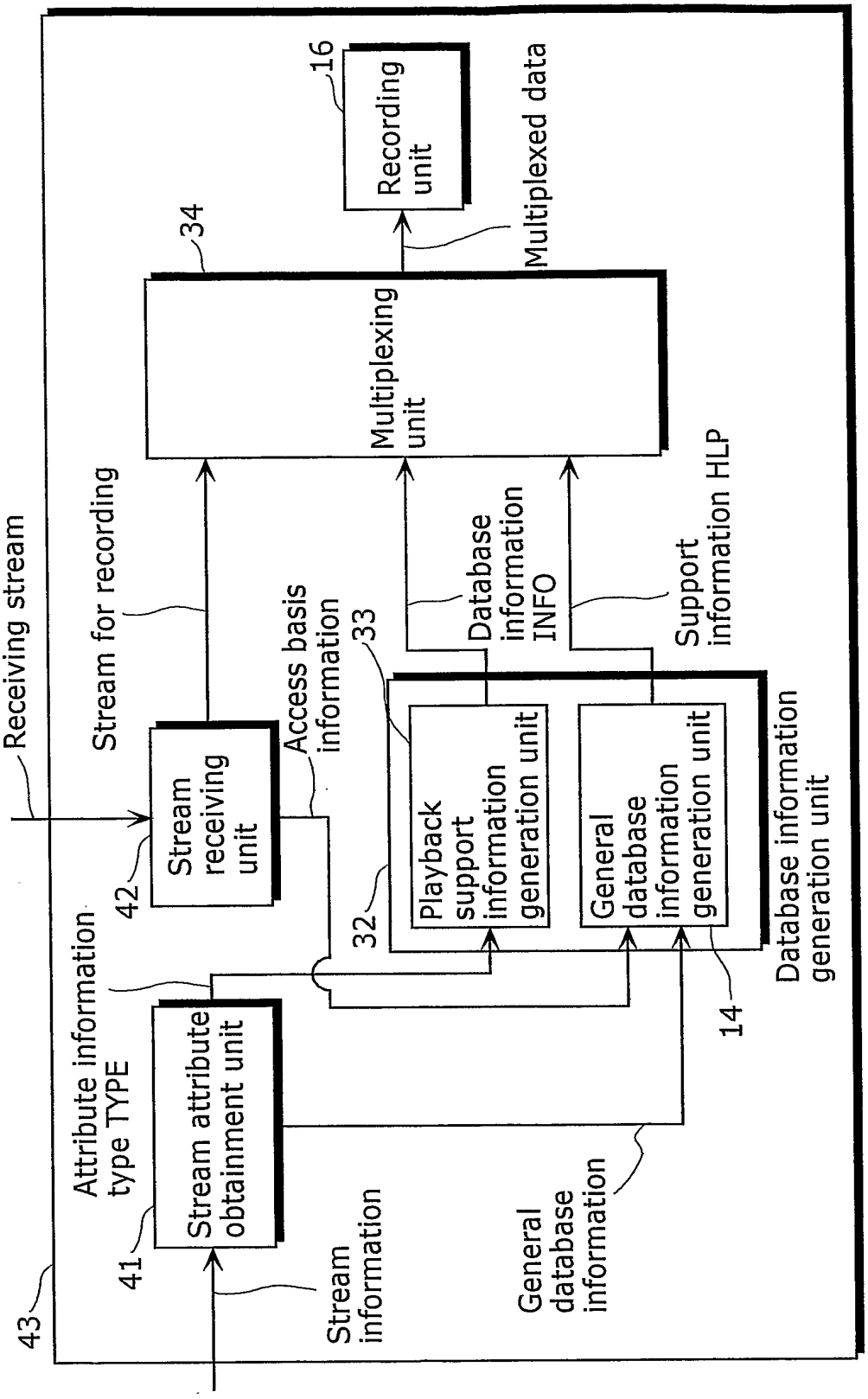

Receiving stream
Stream for recording
Access basis information
Database information INFO
Support information HLP
Attribute information type TYPE
Stream information
General database information
Multiplexed data
Stream receiving unit
Stream attribute obtainment unit
Playback support information generation unit
General database information generation unit
Database information generation unit
Multiplexing unit
Recording unit
42
41
32
33
14
34
16
43

FIG. 23

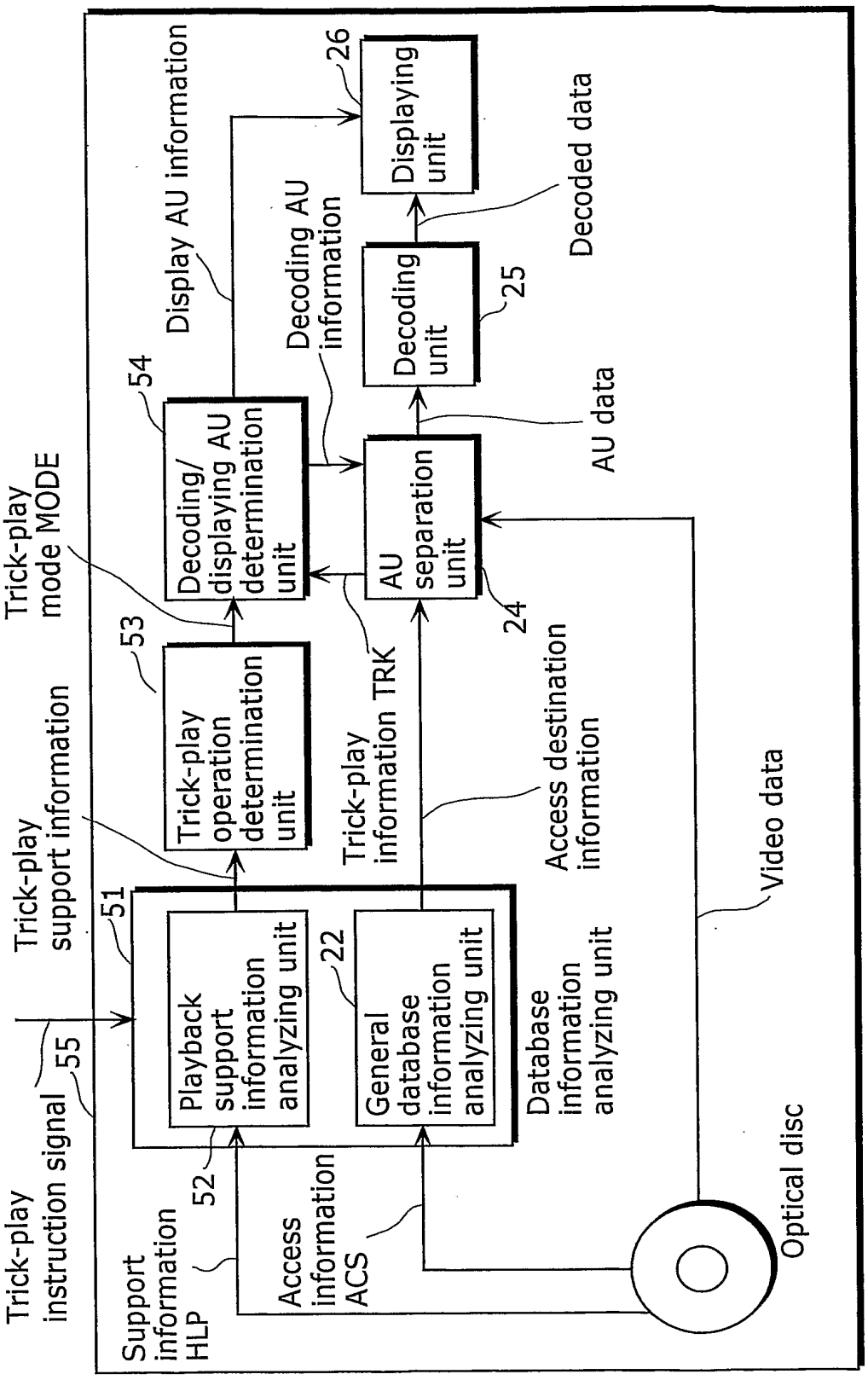

Trick-play instruction signal
55
Support information HLP
Access information ACS
52
Optical disc
Video data
Playback support information analyzing unit
General database information analyzing unit
Database information analyzing unit
51
22
Trick-play support information
Trick-play mode MODE
Trick-play operation determination unit
53
Trick-play information TRK
Access destination information
AU separation unit
24
Decoding/ displaying AU determination unit
54
Display AU information
Decoding AU information
AU data
Decoding unit
25
Decoded data
Displaying unit
26

FIG. 24

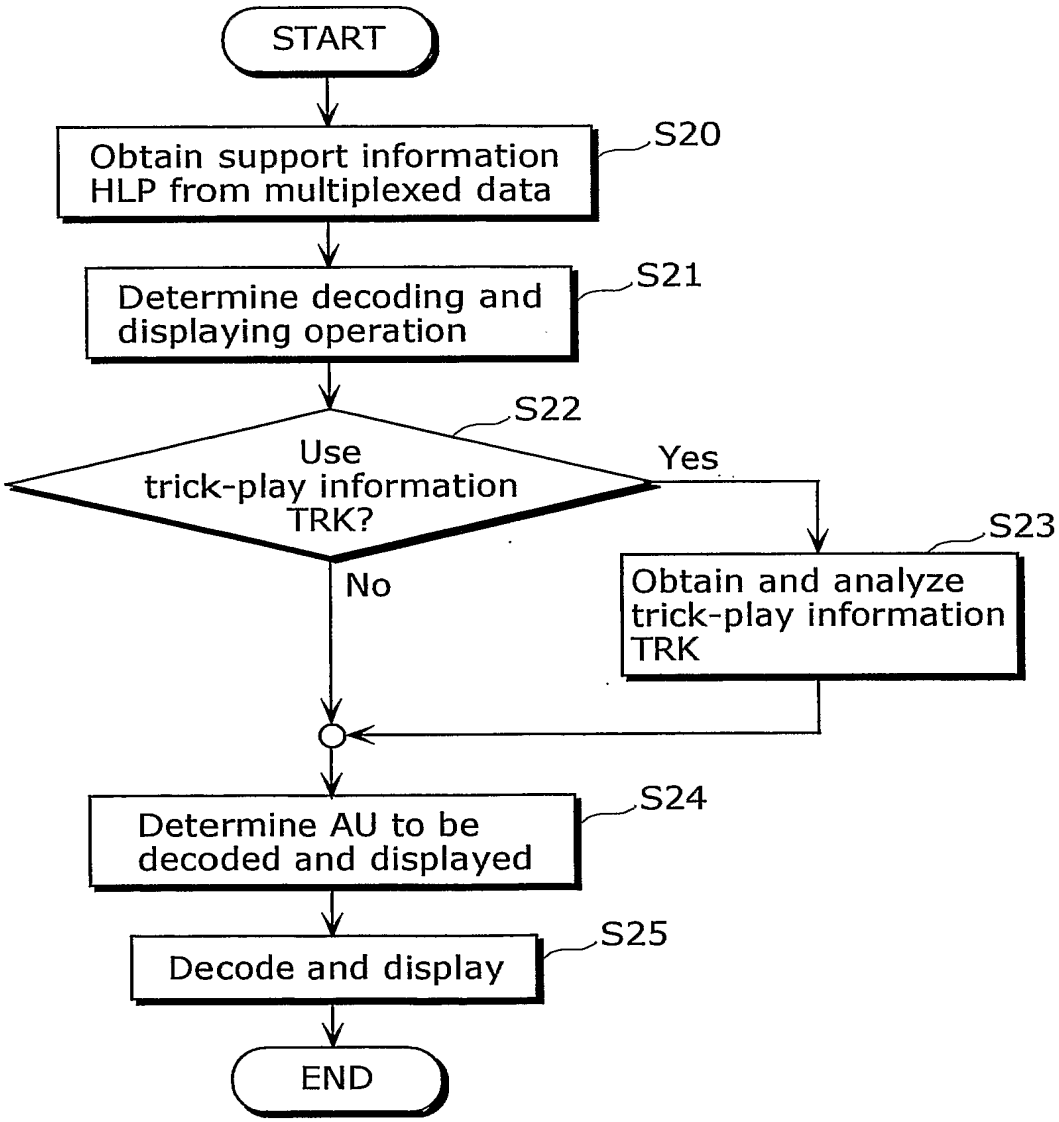

START
Obtain support information HLP from multiplexed data
S20
Determine decoding and displaying operation
S21
Use trick-play information TRK?
S22
Yes
No
Obtain and analyze trick-play information TRK
S23
Determine AU to be decoded and displayed
S24
Decode and display
S25
END

FIG. 25

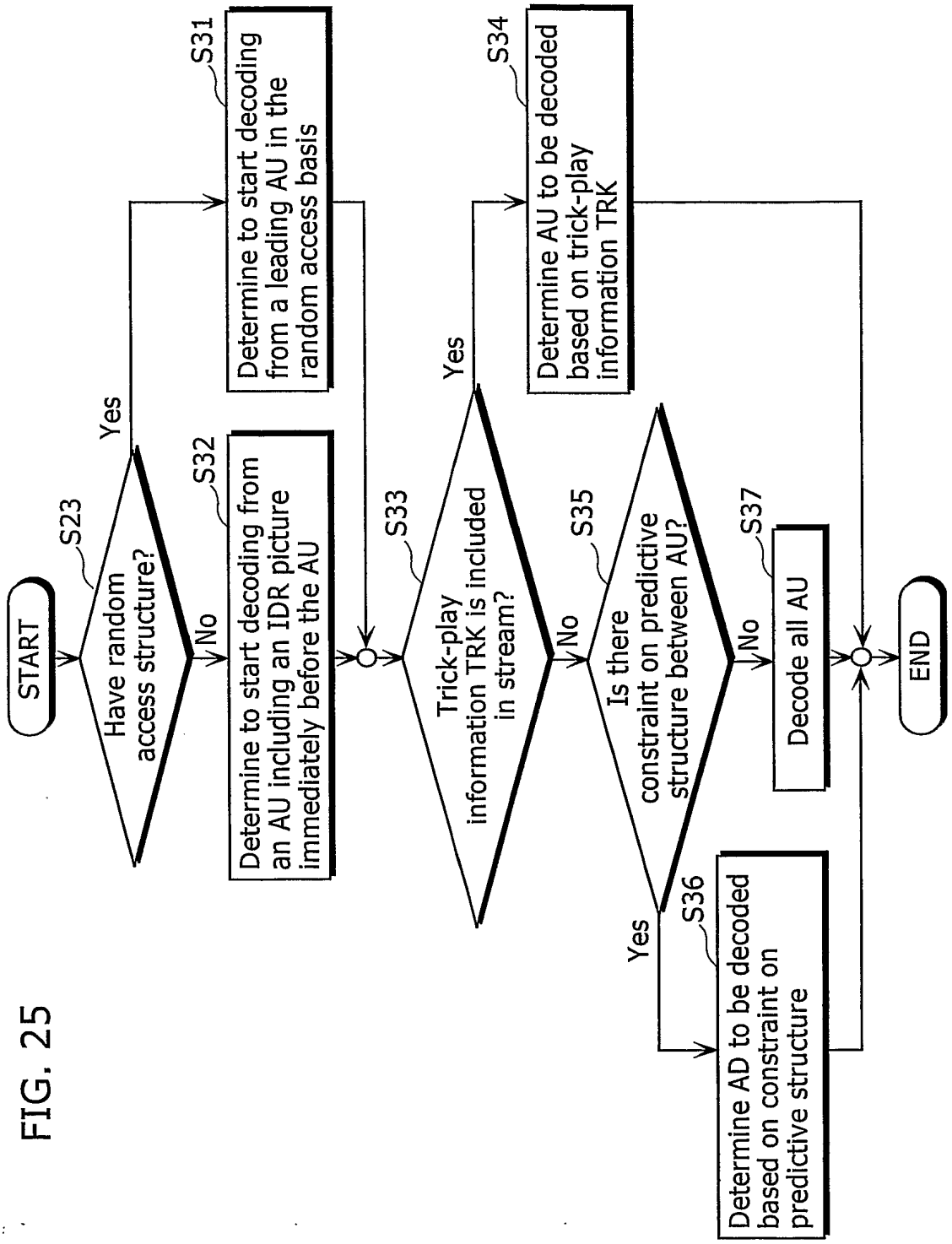

START
S23
Have random access structure?
Yes
No
S31
Determine to start decoding from a leading AU in the random access basis
S32
Determine to start decoding from an IDR picture immediately before the AU
S33
Trick-play information TRK is included in stream?
Yes
No
S34
Determine AU to be decoded based on trick-play information TRK
S35
Is there constraint on predictive structure between AU?
Yes
No
S36
Determine AD to be decoded based on constraint on predictive structure
S37
Decode all AU
END

FIG. 26

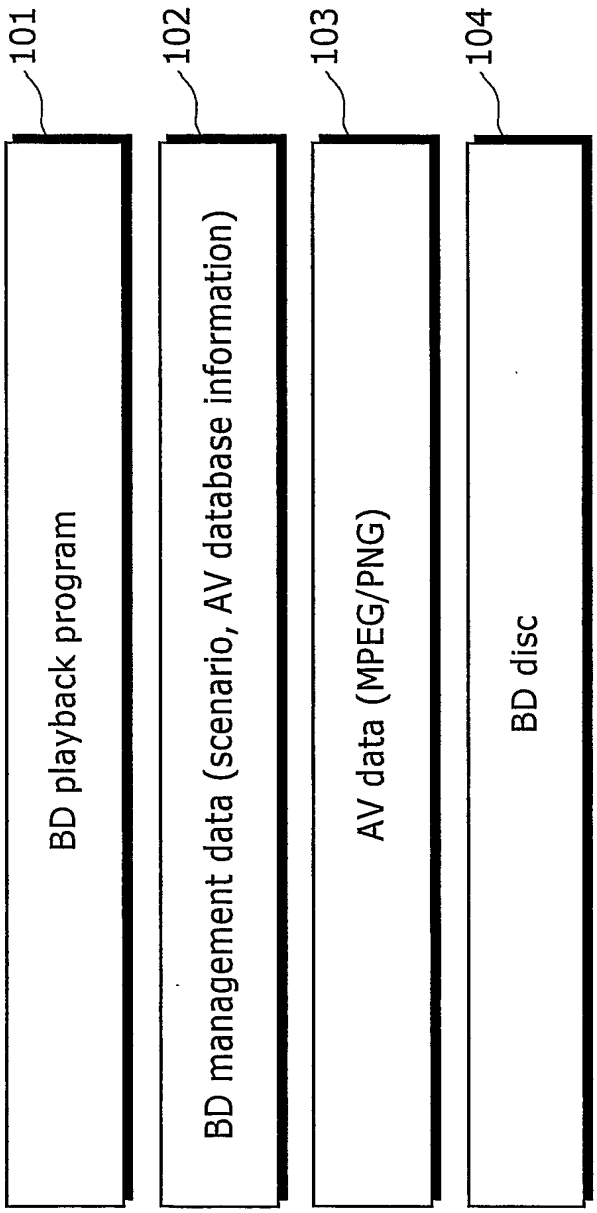

101
102
103
104
BD playback program
BD management data (scenario, AV database information)
AV data (MPEG/PNG)
BD disc

FIG. 27

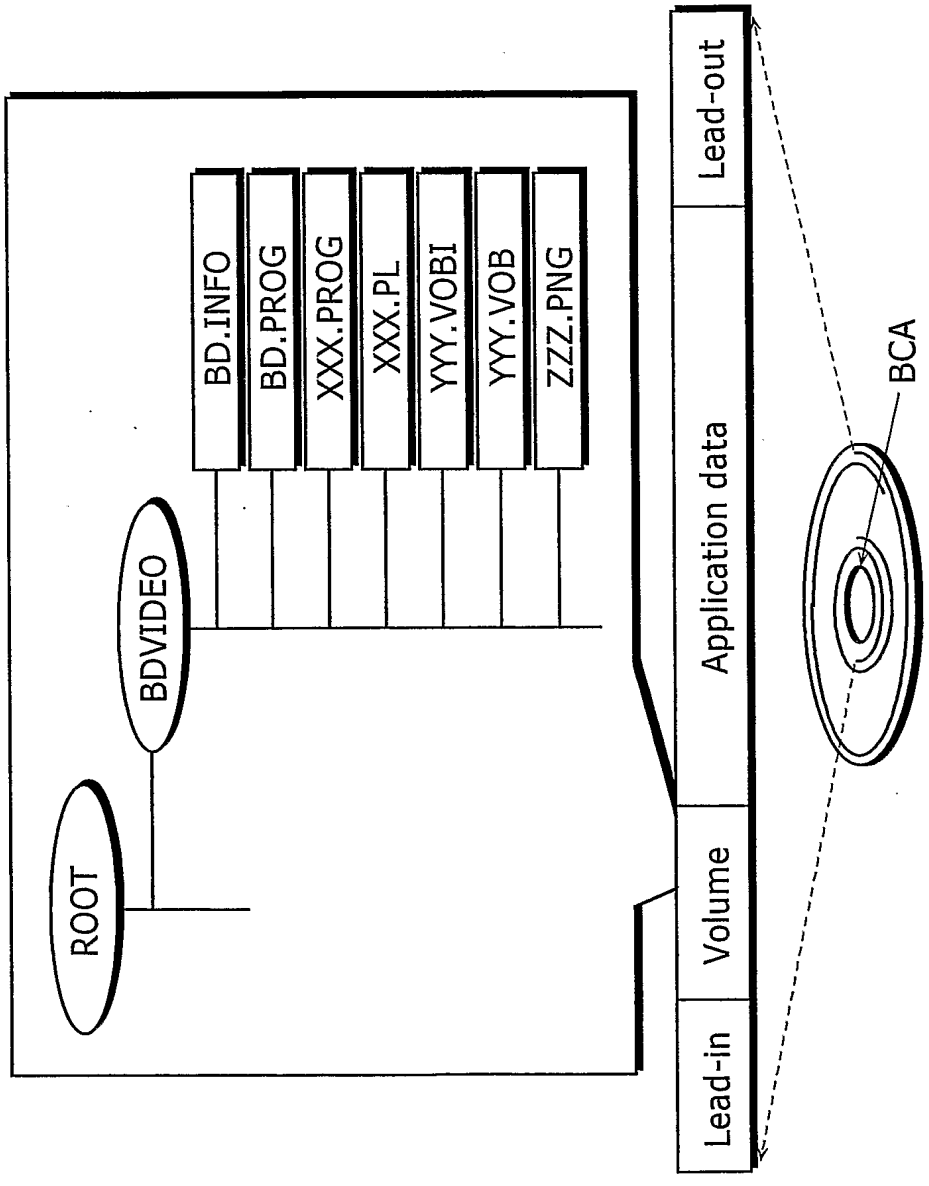

ROOT
BDVIDEO
BD.INFO
BD.PROG
XXX.PROG
XXX.PL
YYY.VOBI
YYY.VOB
ZZZ.PNG
Lead-in
Volume
Application data
Lead-out
BCA

FIG. 28

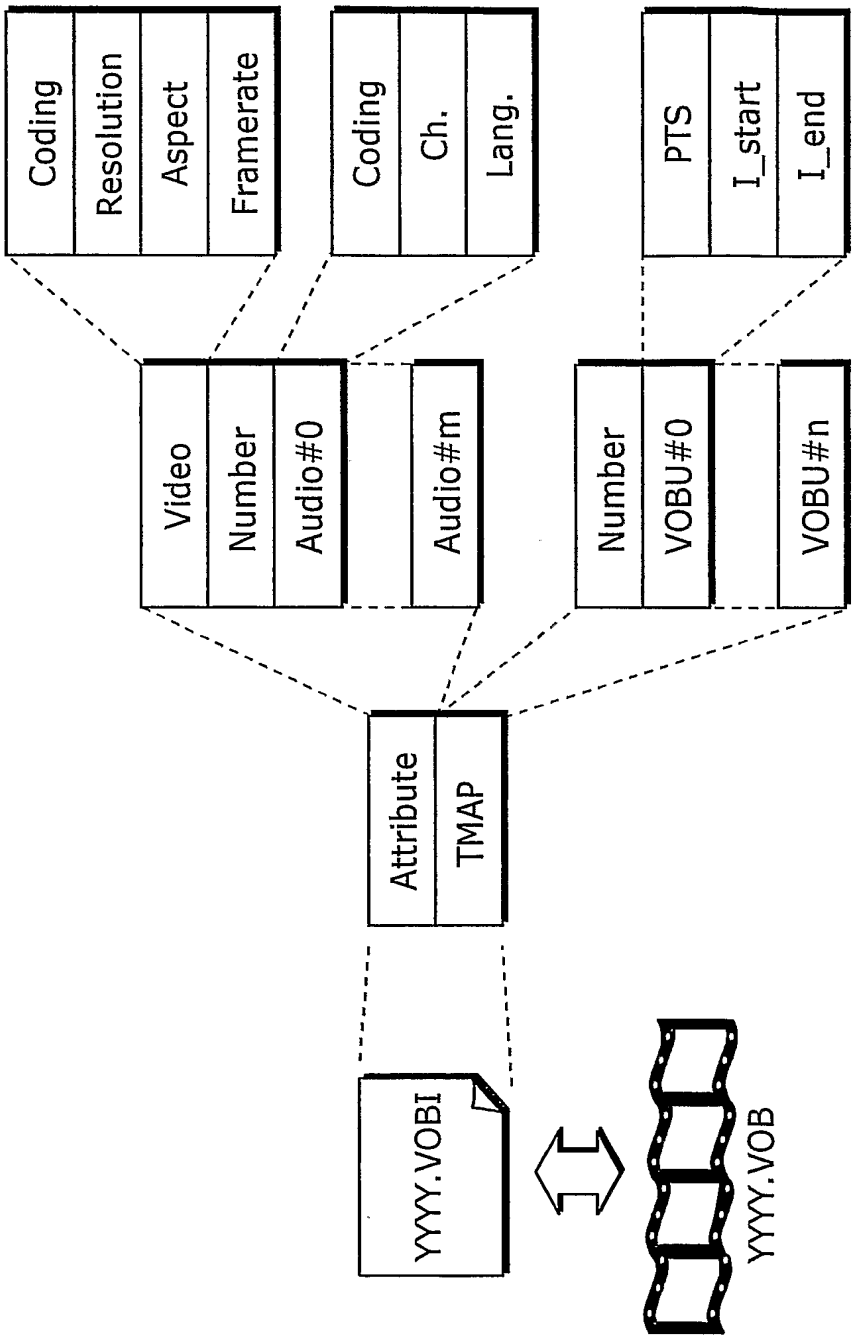
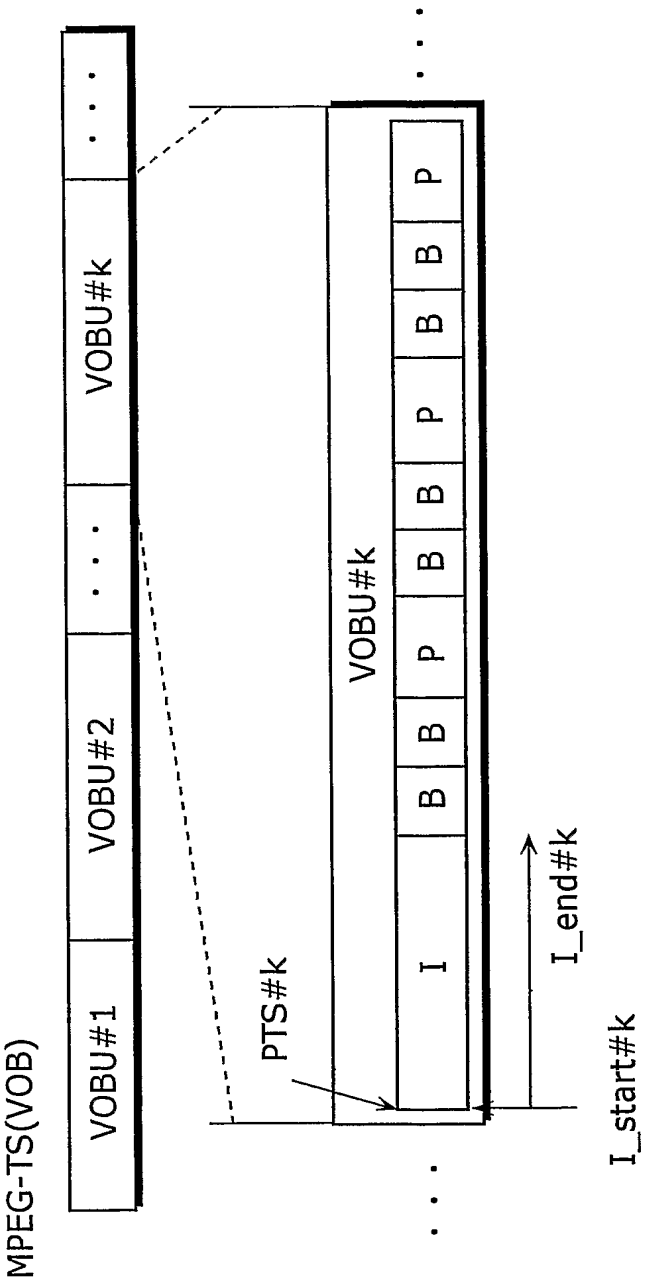

Coding
Resolution
Aspect
Framerate
Coding
Ch.
Lang.
PTS
I_start
I_end
Video
Number
Audio#0
Audio#m
Number
VOBU#0
VOBU#n
Attribute
TMAP
YYYY.VOBI
YYYY.VOB

FIG. 29


MPEG-TS(VOB)
VOBU#1
VOBU#2
VOBU#k
PTS#k
VOBU#k
I
B
B
P
B
B
P
B
B
P
I_end#k
I_start#k

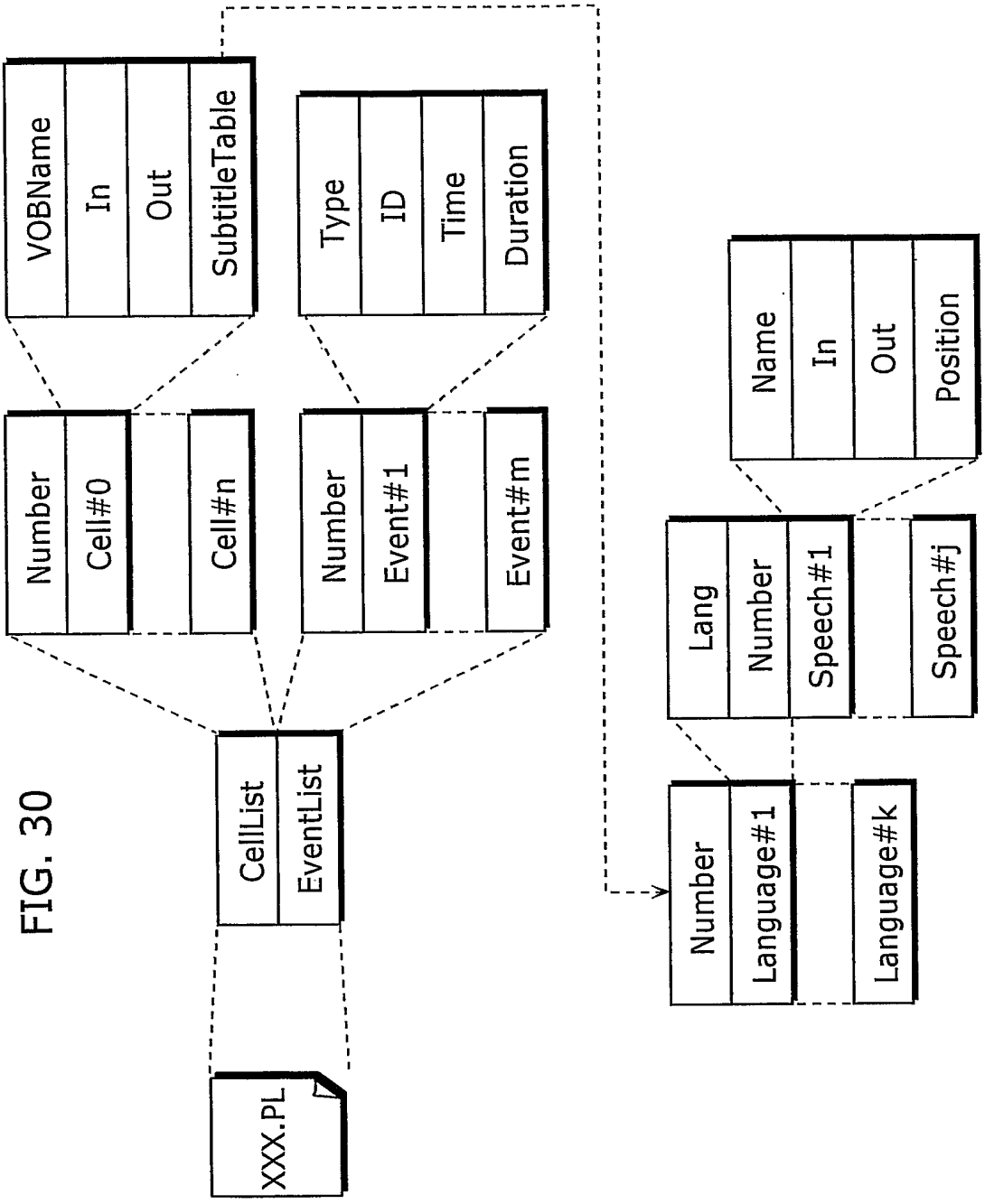

XXX.PL
CellList
EventList
Number
Cell#0
Cell#n
VOBName
In
Out
SubtitleTable
Number
Event#1
Event#m
Type
ID
Time
Duration
Number
Language#1
Language#k
Lang
Number
Speech#1
Speech#j
Name
In
Out
Position

FIG. 30

FIG. 31

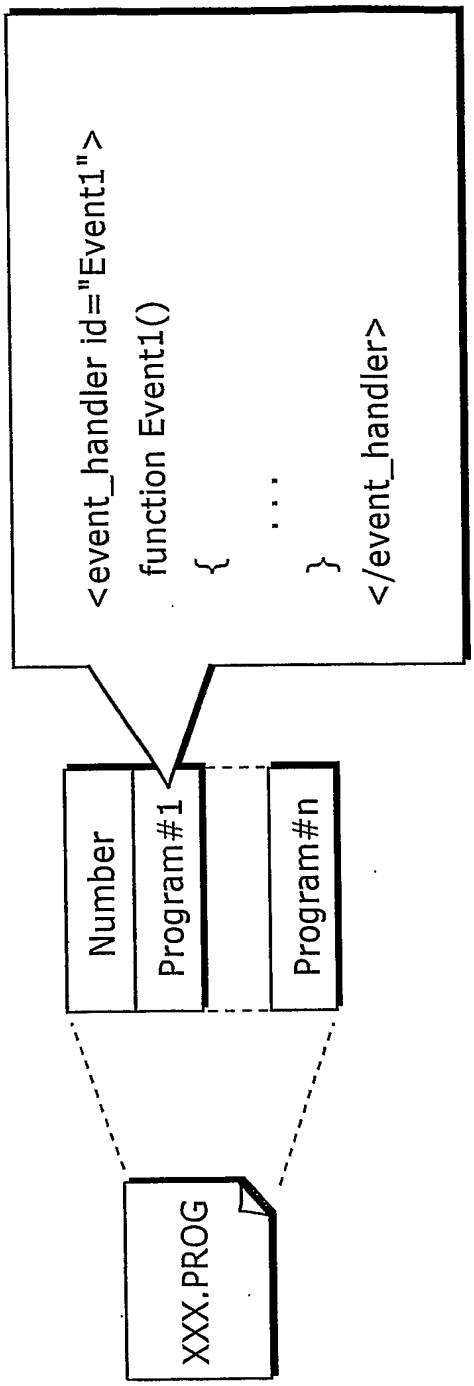

<event_handler id="Event1">
function Event1()
{
...
}
</event_handler>
Number
Program#1
Program#n
XXX.PROG

FIG. 32

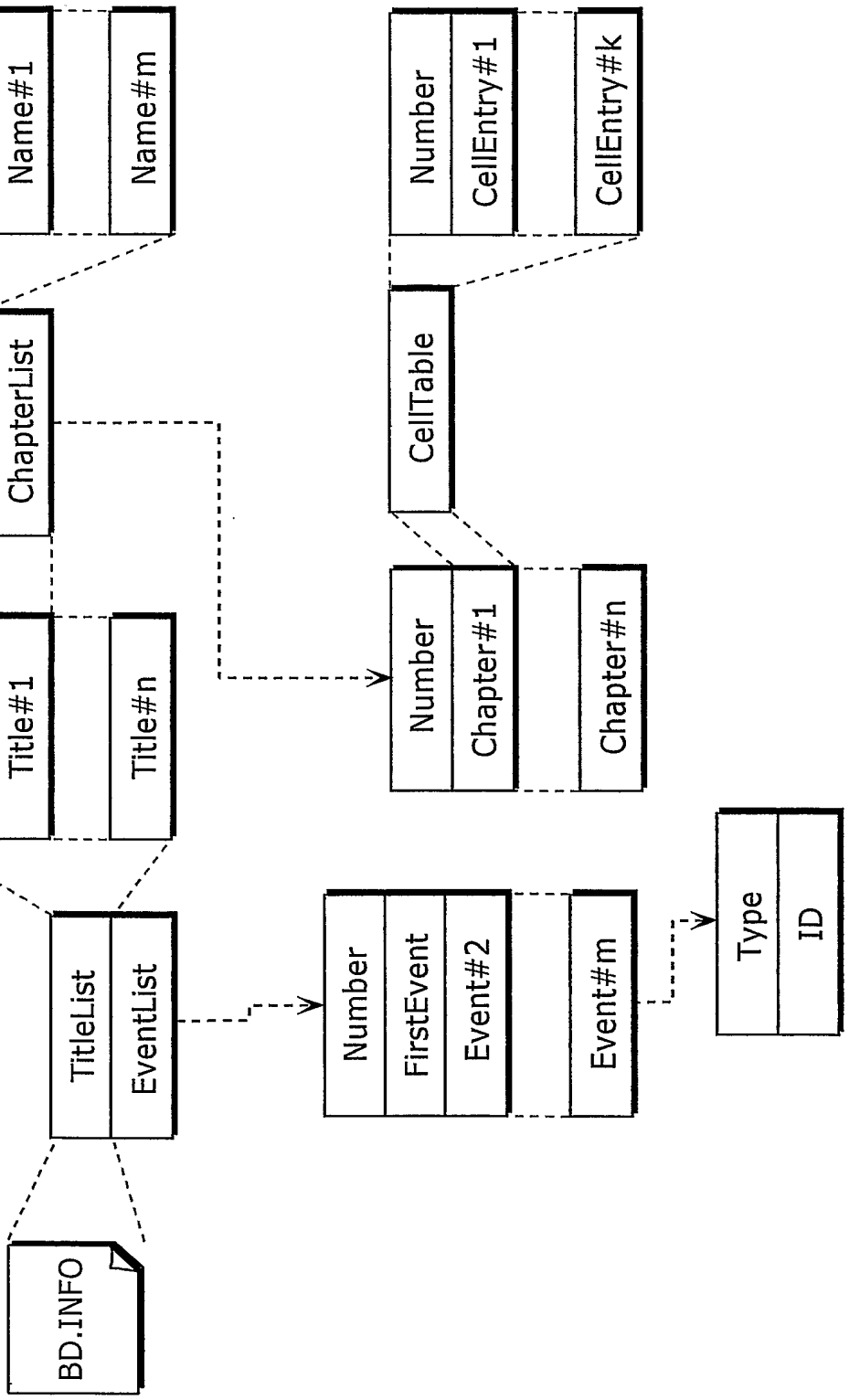

Number
Name#1
Name#m
PLTable
ChapterList
Number
Title#1
Title#n
TitleList
EventList
BD.INFO
Number
CellEntry#1
CellEntry#k
CellTable
Number
Chapter#1
Chapter#n
Number
FirstEvent
Event#2
Event#m
Type
ID

FIG. 33

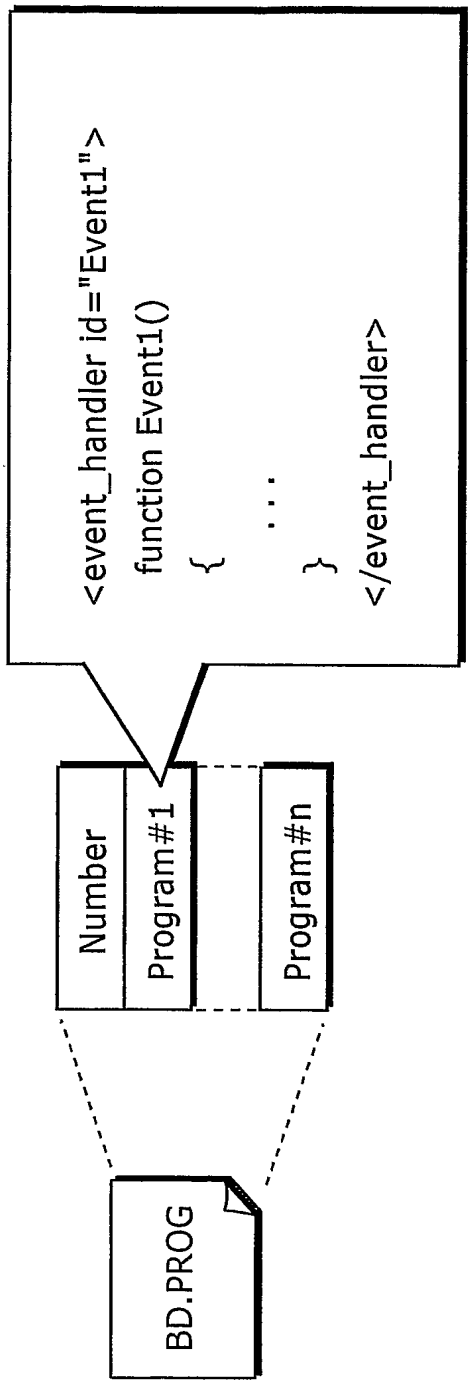

<event_handler id="Event1">
function Event1()
{
...
}
</event_handler>
Number
Program#1
Program#n
BD.PROG

FIG. 34

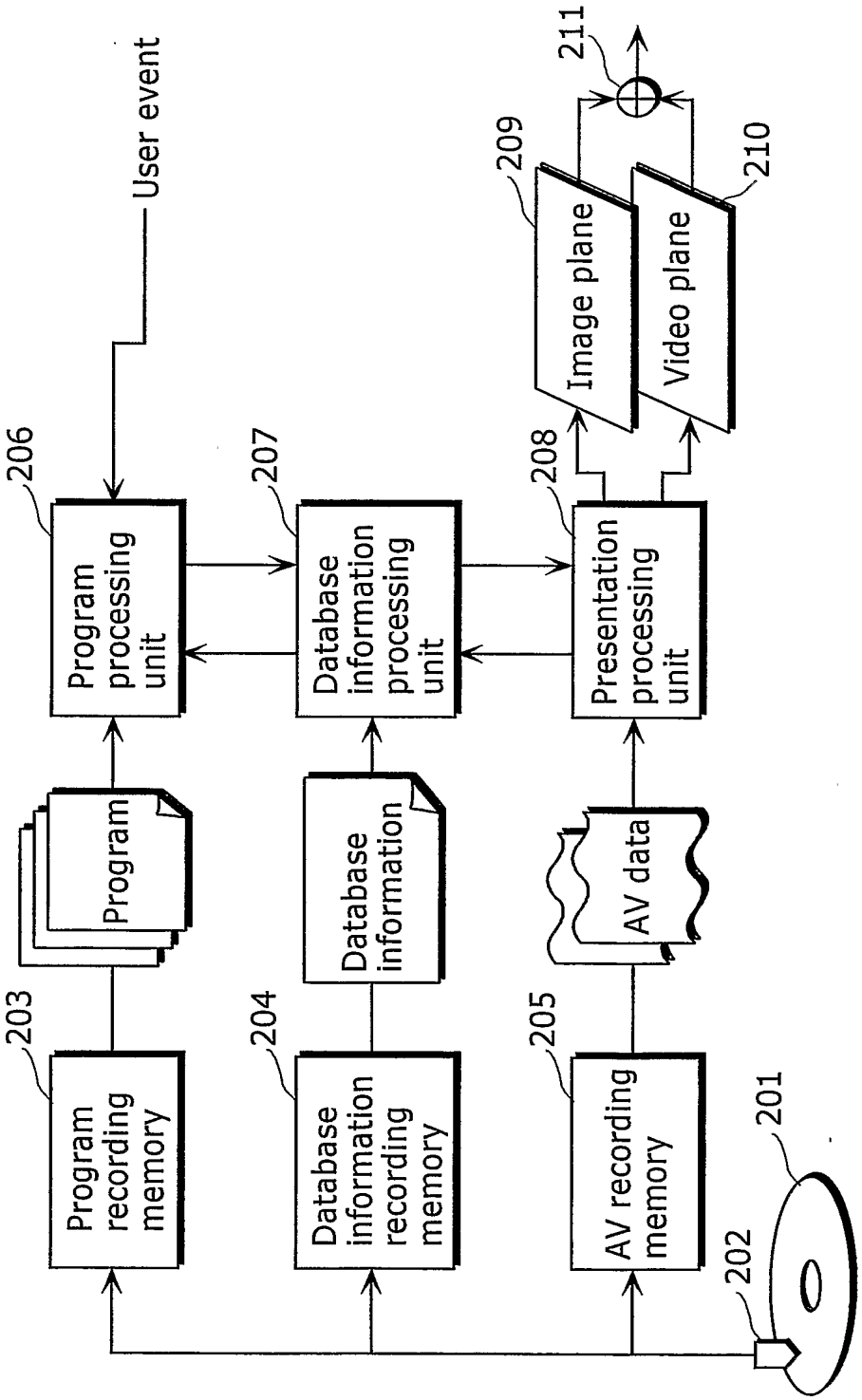

User event
211
209
210
Image plane
Video plane
206
207
208
Program processing unit
Database information processing unit
Presentation processing unit
Program
Database information
AV data
203
204
205
Program recording memory
Database information recording memory
AV recording memory
201
202

Fig. 35A

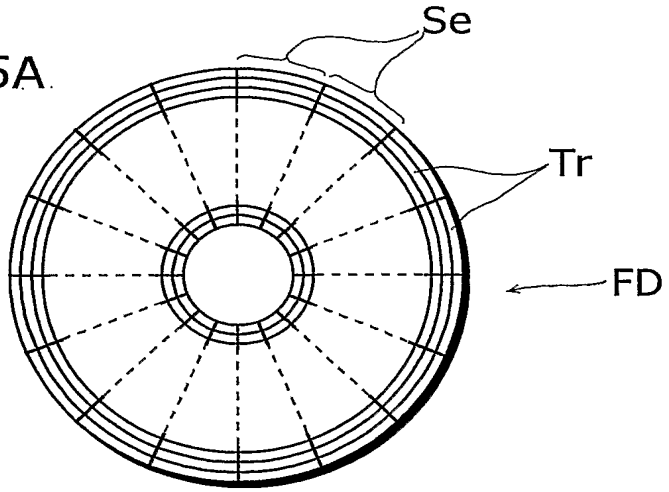


Fig. 35B

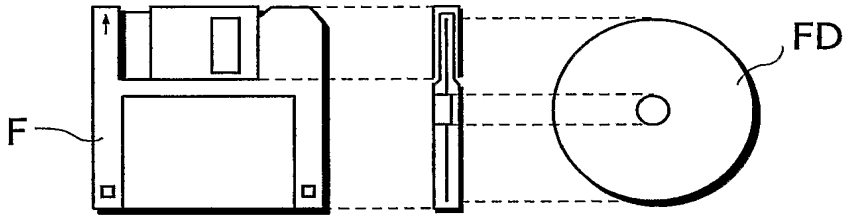
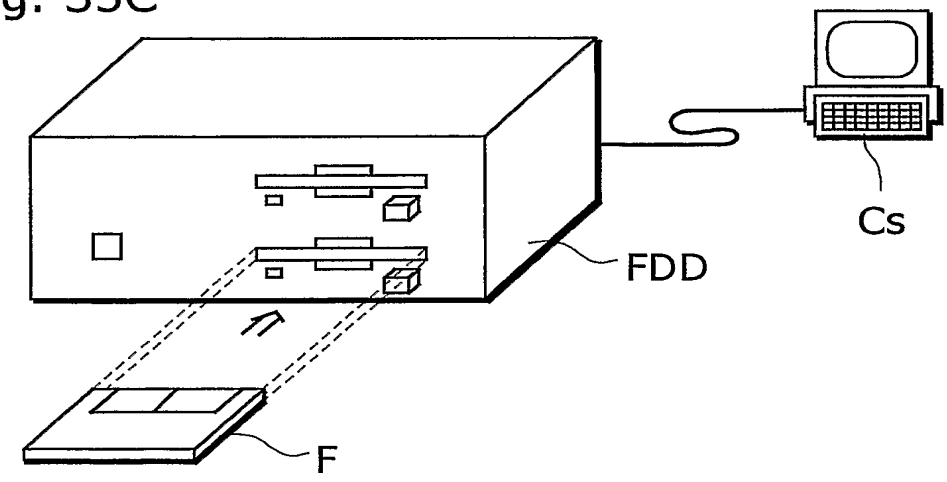



Fig. 35C